

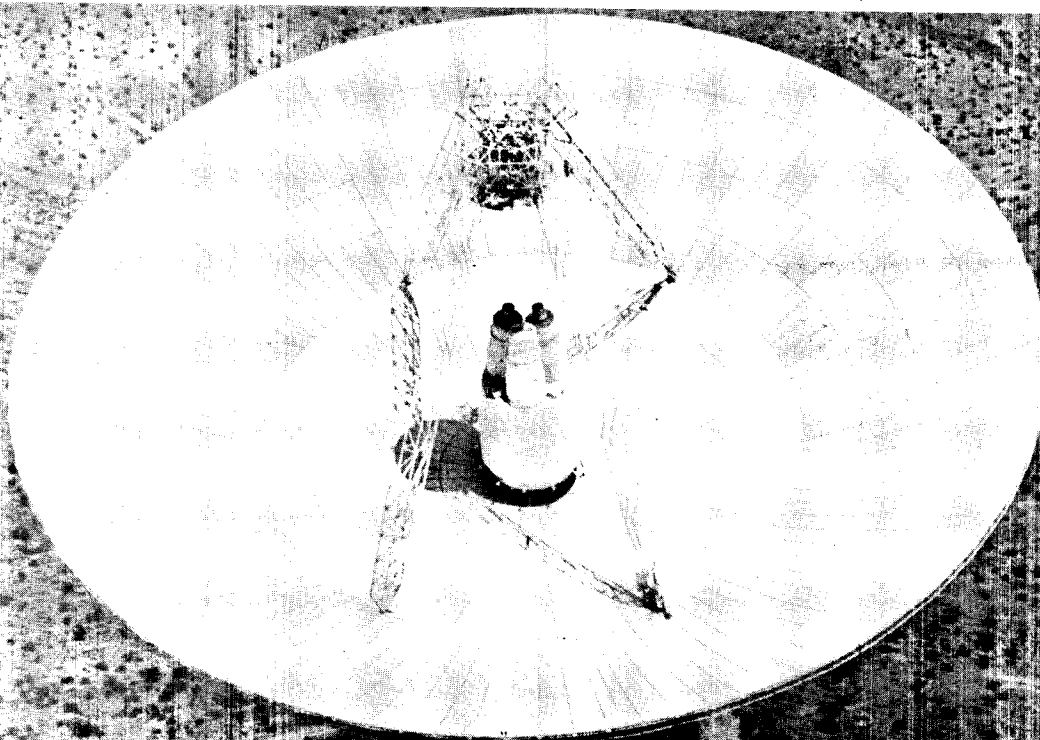
# Environmental Projects: Volume 4

## Asbestos Survey

(NASA-CR-182527) ENVIRONMENTAL PROJECTS.  
VOLUME 4: ASBESTOS SURVEY (Jet Propulsion  
Lab.) 414 p CSCL 13B

N88-18083

Unclas  
G3/45 0126018



Goldstone Deep Space Communications Complex

**JPL**

Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, California

**NASA**

National Aeronautics and  
Space Administration

# Environmental Projects: Volume 4

## Asbestos Survey

Goldstone Deep Space Communications Complex



Jet Propulsion Laboratory  
California Institute of Technology  
Pasadena, California



National Aeronautics and  
Space Administration



The work described in this publication was carried out under the direction of the Jet Propulsion Laboratory, California Institute of Technology, and was supported by the National Aeronautics and Space Administration.

Reference herein to any specific commercial product, process, or service by trade name, or manufacturer does not necessarily constitute an endorsement by the United States Government, the National Aeronautics and Space Administration, or the Jet Propulsion Laboratory, California Institute of Technology.

## ABSTRACT

The Goldstone Deep Space Communications Complex (GDSCC), located in the Mojave Desert about 45 miles north of Barstow, California, and about 150 miles northeast of Pasadena, is part of the National Aeronautics and Space Administration's (NASA's) Deep Space Network, one of the world's largest and most sensitive scientific telecommunications and radio navigation networks. The Goldstone Complex is managed, technically directed, and operated for NASA by the Jet Propulsion Laboratory (JPL) of the California Institute of Technology in Pasadena, California.

Activities at the GDSCC are carried out in support of six large parabolic dish antennas. These activities may give rise to a variety of environmental hazards, particularly the danger of exposure of GDSCC personnel to asbestos fibers that have been shown to be responsible for such serious ailments as asbestosis, lung cancer, and mesothelioma.

Asbestos-containing materials (ACMs) were used in the construction of many of the approximately 100 buildings and structures that were constructed at the GDSCC during a 30-year period from the 1950s through the 1980s. Most of the construction took place before it was known that asbestos could be hazardous to human health.

Thus, M.B. Gilbert Associates (MBGA), Long Beach, California, was retained in June 1986 to carry out two asbestos field surveys at the GDSCC: a comprehensive survey to locate, classify and quantify all ACMs now in use in the diverse buildings, and a more limited survey of selected roofs and boilers. The MBGA reports on these surveys provide guidance and suggestions for asbestos abatement and management plans for the GDSCC. Thus, this present document essentially is an expanded JPL-version involving the combination and integration of two asbestos field survey reports compiled and submitted by MBGA in April 1987 and in September 1987.

Based upon a total of 335 individual samples collected from 38 buildings (288 samples) and the roofs and boilers of 12 selected buildings (47 samples) in the two GDSCC asbestos surveys, 111 occurrences of asbestos were identified in 49 different uses of ACMs (pipe lagging, roofing, interior walls, heating vessels, etc.).

The MBGA surveys found that GDSCC practices involving asbestos are conscientious and forward-thinking. Care is taken to avoid worker exposure to asbestos, and the GDSCC has conducted a facility-wide asbestos-training program as well as pulmonary function testing and respirator fit-testing for the specific personnel who might come into contact with asbestos during their normal work activities. Asbestos-containing wastes are restricted from disposal in the GDSCC solid-waste landfill and, when generated, are properly labeled, bagged, and disposed of at a commercial, permitted hazardous-waste landfill.

A program, due to start in FY 1988 and to be completed by FY 1990, is planned to remove all friable ACMs discovered at the GDSCC during the two asbestos field surveys described above.

## GLOSSARY

ABIH	American Board of Industrial Hygiene
ACM	Asbestos Containing Material
AIHA	American Industrial Hygiene Association
APCD	Air Pollution Control District
AQMD	Air Quality Management District
BLM	U.S. Bureau of Land Management
CAC	California Administrative Code
Cal/OSHA	California Occupational Safety and Health Administration
CF	cubic feet
CFR	Code of Federal Regulations
DHS	Department of Health Services (California)
DOSH	Division of Occupational Safety and Health (California)
DSCC	Deep Space Communications Complex
DSN	Deep Space Network
DSS	Deep Space Station
EIC	Engineer in Charge
EPA	U.S. Environmental Protection Agency (see U.S. EPA)
f/cc	fibers per cubic centimeter
FAC	Facility Asbestos Coordinator
FEV	forced expiratory volume (lungs)
FVC	forced vital capacity (lungs)
GDSCC	Goldstone Deep Space Communications Complex
HEF	High-Efficiency (Antenna)
HEPA	High-Efficiency Particulate Air (Filter)
JPL	Jet Propulsion Laboratory
LF	linear feet

LRWQCB	Lahontan Regional Water Quality Control Board
MBGA	M. B. Gilbert Associates
MSHA	Mine Safety and Health Administration
MTF	Microwave Test Facility
NASA	National Aeronautics and Space Administration
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
NTC	U.S. Army National Training Center
OSHA	Occupational Safety and Health Administration
PAT	Proficiency Analytical Testing
PEL	Permissible Exposure Limit
R&D	research and development
SAI	Spray-Applied Insulation
SBAPCD	San Bernardino Air Pollution Control District
SF	square feet
SOPs	Standard Operating Procedures
STS	Space Transportation System (Space Shuttle)
TDA	Office of Telecommunications and Data Acquisition (JPL)
TSCA	Toxic Substances Control Act
TWA	Time-Weighted Average
U.S. EPA	United States Environmental Protection Agency (see EPA)

## CONTENTS

I.	INTRODUCTION . . . . .	1-1
A.	STATEMENT OF PROBLEM . . . . .	1-1
B.	THE NATURE OF ASBESTOS . . . . .	1-1
C.	ENVIRONMENTAL AND HEALTH PROBLEMS ASSOCIATED WITH ASBESTOS .	1-2
	1. History of Asbestos Use . . . . .	1-2
	2. History of Asbestos-Caused Diseases . . . . .	1-3
D.	GENERAL CHARACTERISTICS OF ASBESTOS-CAUSED DISEASES . . . .	1-8
	1. Inhalation and Ingestion of Asbestos Fibers . . . . .	1-9
	2. Relationship between Type of Asbestos Fibers and Disease . . . . .	1-9
	3. Theories as to How Asbestos Fibers Cause Disease . . .	1-9
E.	ASBESTOS-CAUSED DISEASES . . . . .	1-10
	1. Asbestosis . . . . .	1-10
	2. Lung Cancer. . . . .	1-10
	3. Mesothelioma . . . . .	1-10
	4. Gastrointestinal Cancers . . . . .	1-11
	5. Potential Health Risk as a Function of Airborne Asbestos Levels and Exposed Population Exposure . . .	1-11
II.	REGULATIONS THAT GOVERN MANAGEMENT OF ASBESTOS . . . . .	2-1
A.	INTRODUCTION . . . . .	2-1
B.	FEDERAL REGULATIONS . . . . .	2-1
C.	CALIFORNIA REGULATIONS . . . . .	2-2
	1. Water Quality Requirements: Lahontan Regional Water Quality Control Board . . . . .	2-2
	2. Air Quality Requirements: San Bernardino Air Pollution Control District (SBAPCD) . . . . .	2-3
	3. Hazardous Waste Requirements: California Department of Health Services . . . . .	2-3

4.	California OSHA . . . . .	2-3
5.	Local Requirements: Roofing . . . . .	2-4
D.	NASA GUIDANCE . . . . .	2-4
E.	SUMMARY OF ASBESTOS REGULATIONS . . . . .	2-4
III.	THE GOLDSTONE DEEP SPACE COMMUNICATIONS COMPLEX (GDSCC) . . . . .	3-1
A.	LOCATION OF THE GDSCC . . . . .	3-1
B.	FUNCTIONS OF THE GDSCC . . . . .	3-1
C.	FACILITIES AT THE GDSCC . . . . .	3-3
D.	ANTENNA STATIONS AT THE GDSCC . . . . .	3-7
1.	Echo Site (DSS-12) . . . . .	3-7
2.	Venus Site (DSS-13). . . . .	3-7
3.	Mars Site (DSS-14 and DSS-15) . . . . .	3-7
4.	Apollo Site (DSS-16) . . . . .	3-8
5.	Mojave Base Site (NOAA Antenna) . . . . .	3-8
E.	SUPPORT FACILITIES AT THE GDSCC . . . . .	3-8
1.	Goldstone Dry Lake Airport . . . . .	3-8
2.	Microwave Test Facility and Fire Training Area . . . . .	3-8
3.	Miscellaneous Buildings in the GDSCC Area . . . . .	3-9
4.	Off-Site Facility at Barstow, California . . . . .	3-9
F.	PLANNED FACILITIES TO BE CONSTRUCTED AT THE GDSCC . . . . .	3-9
1.	New 34-Meter Antenna at the Venus Site (DSS-13) . . . . .	3-9
2.	Maintenance and Integration Building at the Mars Site (DSS-14) . . . . .	3-9
G.	NON-STRUCTURAL SUPPORT FACILITIES AT THE GDSCC . . . . .	3-9
1.	Transportation Network . . . . .	3-9
2.	Utilities and Services . . . . .	3-11
H.	WASTE-MANAGEMENT FACILITIES AT THE GDSCC . . . . .	3-11

I.	OPERATIONAL RELATIONSHIPS BETWEEN THE GDSCC AND FORT IRWIN . . . . .	3-11
IV.	THE ASBESTOS SURVEY AT THE GDSCC . . . . .	4-1
A.	INTRODUCTION . . . . .	4-1
B.	ASBESTOS-SURVEY OBJECTIVES . . . . .	4-2
C.	SCOPE OF THE ASBESTOS SURVEY . . . . .	4-3
1.	Selection of Buildings and Structures to be Investigated . . . . .	4-3
2.	Selection of Roofs and Boilers of Specific Buildings to be Investigated . . . . .	4-3
3.	Asbestos Uses Included in the Survey of Buildings/Structures at the GDSCC . . . . .	4-3
4.	Asbestos Uses Included in the Survey of Roofs and Boilers . . . . .	4-4
D.	ORGANIZATION OF THIS REPORT . . . . .	4-4
V.	SUMMARY AND CONCLUSIONS OF THE ASBESTOS SURVEY AT THE GDSCC . . .	5-1
A.	GENERAL FINDINGS . . . . .	5-1
1.	Occurrences and Uses of Asbestos in Buildings/Structures at the GDSCC . . . . .	5-1
2.	Occurrences of Asbestos-Containing Materials in Roofs and Boilers at Specified Buildings at the GDSCC . . .	5-2
3.	Incidental Uses of Asbestos-Containing Material at the GDSCC . . . . .	5-7
4.	Quantities of Asbestos in Buildings and Structures at the GDSCC . . . . .	5-8
5.	Estimated Quantities of Asbestos-Containing Materials Found in Roofing Materials and Boiler Insulation at the GDSCC . . . . .	5-8
6.	Asbestos-Sampling Programs . . . . .	5-11
B.	CONDITION OF ASBESTOS IN BUILDINGS AND STRUCTURES AT THE GDSCC . . . . .	5-11
C.	RATIONALE FOR SUGGESTED TIMING OF ASBESTOS ABATEMENT . . . .	5-12



VI.	INVENTORY OF ASBESTOS OCCURRENCES AT THE GDSCC . . . . .	6-1
A.	INTRODUCTION . . . . .	6-1
B.	FIELD METHODOLOGY . . . . .	6-1
1.	Selection of Buildings and Structures to be Surveyed . . . . .	6-1
2.	Selection of Roofs and Boilers of Specific Buildings to be Surveyed . . . . .	6-1
3.	Asbestos Uses Included in the Survey . . . . .	6-1
4.	Field Investigation and Sampling Protocols for Buildings/Structures . . . . .	6-2
5.	Field Investigation and Sampling Protocols for Roofs and Boilers . . . . .	6-3
6.	Air Sampling and Analysis . . . . .	6-3
7.	Compilation and Evaluation of Field Data . . . . .	6-4
C.	ORGANIZATION OF DATA . . . . .	6-4
1.	Presentation of Data . . . . .	6-4
2.	Explanation of Terminology Used in Descriptions of Facilities . . . . .	6-5
3.	Method Used to Refer to Occurrences of Asbestos in Buildings/Structures at the GDSCC . . . . .	6-9
4.	Method Used to Refer to Occurrences of Asbestos in Roofs and Boilers at the GDSCC . . . . .	6-9
5.	Preparation of Drawings . . . . .	6-10
6.	Sample Numbering System for Buildings/Structures . . . . .	6-10
7.	Sample Numbering System for Roofs and Boilers . . . . .	6-10
D.	INVENTORY OF ASBESTOS IN BUILDINGS AT THE GDSCC . . . . .	6-11
1.	Building G-21 (Echo Site) . . . . .	6-19
2.	Building G-22 (Echo Site) . . . . .	6-31
3.	Building G-23 (Echo Site) . . . . .	6-37
4.	Building G-24 (Echo Site) . . . . .	6-45
5.	Building G-25 (Echo Site) . . . . .	6-49

6.	Building G-26 (Echo Site) . . . . .	6-53
7.	Building G-27 (Echo Site) . . . . .	6-67
8.	Building G-33 (Echo Site) . . . . .	6-71
9.	Building G-36 (Echo Site) . . . . .	6-89
10.	Building G-37 (Echo Site) . . . . .	6-93
11.	Building G-38 (Echo Site) . . . . .	6-97
12.	Building G-42 (Echo Site) . . . . .	6-109
13.	Building G-44 (Echo Site) . . . . .	6-113
14.	Building G-45 (Echo Site) . . . . .	6-119
15.	Building G-47 (Echo Site) . . . . .	6-123
16.	Building G-51 (Venus Site) . . . . .	6-131
17.	Building G-53A (Venus Site) . . . . .	6-139
18.	Building G-56 (Venus Site) . . . . .	6-143
19.	Building G-58 (Venus Site) . . . . .	6-147
20.	Building G-70 (Goldstone Dry Lake Airport) . . . . .	6-155
21.	Building G-71 (Goldstone Dry Lake Airport) . . . . .	6-161
22.	Building G-72 (Microwave Test Facility) . . . . .	6-167
23.	Building G-80 (Mars Site) . . . . .	6-181
24.	Building G-81 (Mars Site) . . . . .	6-187
25.	Building G-86 (Mars Site) . . . . .	6-191
26.	Building G-93 (Main Gate House) . . . . .	6-201
27.	Building Barstow (Barstow Facility) . . . . .	6-205
28.	Building A-1 (Apollo Site) . . . . .	6-213
29.	Building A-2 (Apollo Site) . . . . .	6-217
30.	Building A-7 (Apollo Site) . . . . .	6-221
31.	Building A-8 (Apollo Site) . . . . .	6-227
32.	Building M-1 (Mojave Base Site) . . . . .	6-235

33.	Building M-2 (Mojave Base Site) . . . . .	6-239
34.	Building M-6 (Mojave Base Site) . . . . .	6-243
35.	Building M-8 (Mojave Base Site). . . . .	6-249
36.	Building M-9 (Mojave Base Site) . . . . .	6-253
37.	Miscellaneous Uses of Asbestos at the GDSCC . . . . .	6-258
VII.	ASBESTOS ABATEMENT PLAN . . . . .	7-1
A.	INTRODUCTION . . . . .	7-1
B.	ASBESTOS ABATEMENT AND CONTROL MEASURES . . . . .	7-1
1.	Removal, Disposal and Replacement . . . . .	7-1
2.	Encapsulation with Sealants . . . . .	7-3
3.	Enclosure . . . . .	7-3
4.	Interim Measures to Protect Personnel . . . . .	7-4
C.	TYPICAL ASBESTOS ABATEMENT PROCEDURES . . . . .	7-4
1.	Reporting Requirements . . . . .	7-4
2.	Shutdown of Building During Asbestos-Abatement Activities . . . . .	7-5
3.	Work Area Sealing and Cleaning During Asbestos- Abatement Activities . . . . .	7-6
4.	Worker Protection . . . . .	7-7
5.	Environmental Protection . . . . .	7-10
6.	Transport/Disposal of Asbestos Material . . . . .	7-11
7.	Air Sampling and Analysis in Connection with Asbestos-Abatement Procedures . . . . .	7-12
8.	Recordkeeping Requirements . . . . .	7-14
VIII.	ASBESTOS-MANAGEMENT PLAN . . . . .	8-1
A.	INTRODUCTION . . . . .	8-1
B.	STANDARD OPERATING PROCEDURES (SOPs) . . . . .	8-1

C.	IDENTIFICATION, INSPECTION AND REPAIR OF ASBESTOS-CONTAINING MATERIALS (ACMs) . . . . .	8-2
1.	Asbestos-Containing Pipe Insulation . . . . .	8-2
2.	Repair, Removal and Replacement of ACM . . . . .	8-3
D.	PROCEDURES AND OPTIONS FOR MANAGEMENT OF ASBESTOS IN ROOFS AND BOILERS AT THE GDSCC . . . . .	8-3
E.	CAUTION SIGNS AND LABELS . . . . .	8-3
F.	EMPLOYEE PROTECTION AND TRAINING . . . . .	8-3
1.	Respiratory Protection . . . . .	8-3
2.	Employee Training . . . . .	8-4
G.	HOUSEKEEPING AND DISPOSAL PRACTICES . . . . .	8-5
H.	MEDICAL SURVEILLANCE AND RECORD KEEPING . . . . .	8-5
J.	REPORTING REQUIREMENTS . . . . .	8-6
IX.	FUTURE PLANS FOR ASBESTOS ABATEMENT AND MANAGEMENT AT THE GDSCC . . . . .	9-1
X.	BIBLIOGRAPHY . . . . .	10-1
XI.	CERTIFICATION . . . . .	11-1

## APPENDIXES

A.	TERMINOLOGY AND DEFINITIONS OF WORDS AND TERMS ASSOCIATED WITH ASBESTOS IN THE ENVIRONMENT . . . . .	A-1
B.	BUILDING-BY-BUILDING SAMPLE RESULTS OF ASBESTOS SURVEY AT THE GDSCC/BARSTOW . . . . .	B-1
C.	PROTOCOL USED TO CONDUCT THE FIELD SURVEY FOR ASBESTOS AT THE GDSCC . . . . .	C-1
D.	PROTOCOL FOR THE COLLECTION OF ASBESTOS SAMPLES . . . . .	D-1
E.	GUIDANCE FOR THE SELECTION OF THE SUGGESTED TIMING FOR ASBESTOS-ABATEMENT PROCEDURES . . . . .	E-1
F.	CRITERIA FOR SELECTION OF AN ASBESTOS-ABATEMENT CONTRACTOR . . . . .	F-1
G.	ASBESTOS-ABATEMENT CHECKLIST . . . . .	G-1

H.	RESPIRATORY PROTECTION AGAINST MICROSCOPIC ASBESTOS FIBERS .	H-1
J.	LEVEL I AND II ASBESTOS TRAINING PROGRAMS . . . . .	J-1
K.	LETTERS AND DISCLAIMERS SENT FROM M.B. GILBERT ASSOCIATES TO THE JET PROPULSION LABORATORY, THAT ACCOMPANIED SUBMITTED REPORTS DESCRIBING THE TWO ASBESTOS FIELD SURVEYS CONDUCTED AT THE GOLDSTONE COMPLEX . . . . .	K-1
L.	NASA OCCUPATIONAL HEALTH OFFICE GUIDELINES (1983) FOR ASBESTOS HAZARD-ASSESSMENT AND ABATEMENT . . . . .	L-1

## Figures

1.	Modes and Rates of Asbestos Fiber Dispersal . . . . .	1-4
2.	Geographic Relationship of the Goldstone Deep Space Communications Complex to JPL in Pasadena . . . . .	3-2
3.	The Three-Continent NASA Deep Space Network as it Existed in 1986 . . . . .	3-4
4.	Schematic Map of the Goldstone DSCC Showing Locations of the Six NASA Deep Space Stations (DSSs) . . . . .	3-5
5.	Artist's Drawing of the Proposed New 34-Meter Antenna at the Venus Site . . . . .	3-10
6.	Major Roads Leading to and at the Goldstone DSCC . . . . .	3-12
7.	Echo Site: Plot Plan . . . . .	6-17
8.	Echo Site: Administration and Cafeteria Building G-21 . . . .	6-25
9.	Typical Asbestos-Containing Floor Tiles in Building G-21 and in Many Other Buildings at the GDSCC . . . . .	6-27
10.	Echo Site: Building G-21, Mechanical Equipment Room 127, Asbestos-Containing Pipe Lagging . . . . .	6-28
11.	Echo Site: Building G-21, Mechanical Equipment Room 127, Asbestos-Containing Pipe Lagging . . . . .	6-29
12.	Echo Site: Building G-21, Boiler Room 128, Asbestos-Containing Pipe Lagging . . . . .	6-30
13.	Echo Site: Fire Line Pump House G-22 . . . . .	6-33
14.	Echo Site: Asbestos-Containing Insulation around Fire System Water Supply Pipe Exterior to Fire Line Pump House G-22. Typical Asbestos-Containing Insulation Covering Pipes that Enter or Leave Buildings G-22, G-27, G-38, G-58 and M-6 at the GDSCC . . . . .	6-35

15.	Echo Site: Dormitory Building G-23 . . . . .	6-41
16.	Echo Site: Building G-23, Boiler Room 107, Asbestos-Containing Pipe Lagging . . . . .	6-43
17.	Echo Site: Building G-23, Mechanical Equipment Room 108, Asbestos-Containing Pipe Lagging . . . . .	6-44
18.	Echo Site: Generator Building G-24 . . . . .	6-47
19.	Echo Site: Transportation Maintenance Building G-25 . . . .	6-51
20.	Echo Site: Control Building G-26 . . . . .	6-61
21.	Echo Site: Control Building G-26 . . . . .	6-62
22.	Echo Site: Building G-26, Mechanical Equipment Room 108, Asbestos-Containing Pipe Lagging . . . . .	6-63
23.	Echo Site: Building G-26, Boiler Room 110, Toward Ceiling, Asbestos-Containing Pipe Lagging . . . . .	6-64
24.	Echo Site: Building G-26, Boiler Room 110, Toward Floor, Asbestos-Containing Pipe Lagging . . . . .	6-65
25.	Echo Site: Building G-26, Tape Vaults Room 128P, Typical Tape Vaults Constructed of Asbestos-Containing Transite Board . . . . .	6-66
26.	Echo Site: Office and Storage Building G-27 . . . . .	6-69
27.	Echo Site: Engineering and Communications Building G-33 . .	6-79
28.	Echo Site: Building G-33, Boiler Room 133, Asbestos-Containing Pipe Lagging . . . . .	6-81
29.	Echo Site: Building G-33, Mechanical Equipment Room 134, Asbestos-Containing Pipe Lagging . . . . .	6-82
30.	Echo Site: Building G-33, Electrical Room 138, Asbestos-Containing Pipe Lagging . . . . .	6-83
31.	Echo Site: Building G-33, Boiler Room 140, Asbestos-Containing Pipe Lagging . . . . .	6-84
32.	Echo Site: Building G-33, Boiler Room 140, Asbestos-Containing Pipe Lagging . . . . .	6-85
33.	Echo Site: Building G-33, Mechanical Equipment Room 141, Asbestos-Containing Pipe Lagging . . . . .	6-86
34.	Echo Site: Building G-33, Mechanical Equipment Room 141, Asbestos-Containing Pipe Lagging . . . . .	6-87

35.	Echo Site: Collimation Tower Building G-36 . . . . .	6-91
36.	Echo Site: Seismic Laboratory Building G-37 . . . . .	6-95
37.	Echo Site: Network Laboratory and Maintenance Facility Building G-38 . . . . .	6-103
38.	Echo Site: Network Laboratory and Maintenance Facility Building G-38 . . . . .	6-104
39.	Echo Site: Building G-38, Mechanical Equipment Room 115, Asbestos-Containing Pipe Lagging . . . . .	6-105
40.	Echo Site: Building G-38, Boiler Room 129, Asbestos-Containing Pipe Lagging and Boiler Insulation . . .	6-106
41.	Echo Site: Building G-38, Mechanical Equipment Room 131, Asbestos-Containing Pipe Lagging . . . . .	6-107
42.	Echo Site: Garage Building G-42 . . . . .	6-111
43.	Echo Site: Flammable Drum Storage Building G-44 . . . . .	6-115
44.	Echo Site: Building G-44, Flammable Drum Storage Shed Constructed with Asbestos-Containing Transite Wall Board . .	6-117
45.	Echo Site: Storage Building G-45 . . . . .	6-121
46.	Echo Site: Carpenter Shop Building G-47 . . . . .	6-125
47.	Venus Site: Plot Plan . . . . .	6-129
48.	Venus Site: Control Building G-51 . . . . .	6-135
49.	Venus Site: Building G-51, Mechanical Equipment Room 106, Asbestos-Containing Pipe Lagging . . . . .	6-137
50.	Venus Site: Building G-51, Boiler Room 107, Asbestos-Containing Pipe Lagging . . . . .	6-138
51.	Venus Site: Transmitter Building G-53A. . . . .	6-141
52.	Venus Site: Security Building G-56. . . . .	6-145
53.	Venus Site: 30' Hydro-Mech and Transmitter Building G-58 . . . . .	6-149
54.	Goldstone Dry Lake Airport Plot Plan . . . . .	6-151
55.	Goldstone Dry Lake Airport Terminal Area . . . . .	6-153
56.	Goldstone Dry Lake Airport: Battery and Portable Generator Building G-70 . . . . .	6-157



57.	Goldstone Dry Lake Airport: Building G-70, Roof, Asbestos-Containing Roofing Material Typical of Asbestos Roofing Construction for Many Roofs at the GDSCC . . .	6-159
58.	Goldstone Dry Lake Airport: Airport Facilities Building G-71 . . . . .	6-163
59.	Microwave Test Facility and Fire Training Area Plot Plan . .	6-165
60.	Microwave Test Facility: Microwave Test Facility Building G-72 . . . . .	6-173
61.	Microwave Test Facility: Microwave Test Facility Building G-72 . . . . .	6-174
62.	Microwave Test Facility: Building G-72, Boiler Room 110, Asbestos-Containing Pipe Lagging and Boiler Insulation . . .	6-175
63.	Microwave Test Facility: Building G-72, Mechanical Equipment Room 111, Asbestos-Containing Pipe Lagging . . . .	6-176
64.	Mars Site: Plot Plan . . . . .	6-179
65.	Mars Site: 64 Meter Antenna Building G-80 . . . . .	6-183
66.	Mars Site: Building G-80, First Floor . . . . .	6-184
67.	Mars Site: Building G-80, Second Floor . . . . .	6-185
68.	Mars Site: Building G-80, Alidade Building . . . . .	6-186
69.	Mars Site: Generator Building G-81 . . . . .	6-189
70.	Mars Site: Operations Support Building G-86 . . . . .	6-195
71.	Mars Site: Operations Support Building G-86 . . . . .	6-196
72.	Mars Site: Building G-86, Tape Vault Plenum Room 101, Typical Tape Vaults Constructed of Asbestos-Containing Transite Board . . . . .	6-197
73.	Mars Site: Building G-86, Mechanical Equipment Room 104, Asbestos-Containing Pipe Lagging . . . . .	6-198
74.	Mars Site: Building G-86, Mechanical Equipment Room 104, Asbestos-Containing Pipe Lagging . . . . .	6-199
75.	GDSCC: Main Gate House Building G-93 . . . . .	6-203
76.	Barstow Facility . . . . .	6-207
77.	Apollo Site: Plot Plan . . . . .	6-211

78.	Apollo Site: Operations Building A-1 . . . . .	6-215
79.	Apollo Site: Cafeteria and Administration Building A-2. . .	6-219
80.	Apollo Site: 9-Meter Antenna Equipment Building A-7 . . . .	6-223
81.	Apollo Site: Building A-7, Asbestos-Containing Insulation in Wall Structure . . . . .	6-225
82.	Apollo Site: Building A-7, Asbestos-Containing Insulation in Wall Structure . . . . .	6-226
83.	Apollo Site: 9-Meter Antenna Collimation Tower Building A-8 . . . . .	6-229
84.	Mojave Base Site: Plot Plan . . . . .	6-233
85.	Mojave Base Site: Minitrack Building M-1 . . . . .	6-237
86.	Mojave Base Site: Logistics Building M-2 . . . . .	6-241
87.	Mojave Base Site: Telemetry Building M-6 . . . . .	6-245
88.	Mojave Base Site: Building M-6, Roof-Mounted Equipment with Asbestos-Containing Pipe Lagging . . . . .	6-247
89.	Mojave Base Site: Operations Building M-8 . . . . .	6-251
90.	Mojave Base Site: Generator Building M-9 . . . . .	6-255
91.	Mojave Base Site: Building M-9, Engine Generator and Gas Turbine Generator Room 108, Typical Asbestos- Containing Lagging for Engine Exhaust Piping . . . . .	6-257
92.	Typical Asbestos-Containing, Underground Electrical Conduit (Unearthed and Broken) . . . . .	6-260
93.	Illustration of "Glove Bag" Apparatus used in the Removal of Small Areas of Asbestos . . . . .	7-2

#### Tables

1.	Asbestos-Forming Silicate Minerals . . . . .	1-2
2.	Various Types of Friable and Non-Friable Asbestos Materials and Products (as of 1977) . . . . .	1-5
3.	Major Facilities at the GDSCC . . . . .	3-6
4.	Summary of Findings of Buildings Surveyed for Asbestos- Containing Materials at the GDSCC . . . . .	5-3

5.	Results of Tests for Asbestos-Containing Materials in Roofs and Boilers at Specified Buildings at the GDSCC . . .	5-6
6.	Asbestos-Containing Materials Found at the GDSCC . . . . .	5-9
7.	Quantities of Asbestos-Containing Materials Found in Roofing and Boilers at Specified Buildings Surveyed at the GDSCC . . . . .	5-10
8.	Condition of Asbestos at the GDSCC and Recommended Abatement Timing . . . . .	5-13
9.	Condition of Asbestos in Roofs and Boilers at Specified Buildings at the GDSCC and Recommended Abatement Timing . .	5-17

## SECTION I

### INTRODUCTION

#### A. STATEMENT OF PROBLEM

Large quantities of asbestos-containing materials commonly have been used at National Aeronautics and Space Administration (NASA) facilities both as insulation and materials of construction in buildings/structures constructed prior to 1978. It now is accepted, however, that inhalation or ingestion of airborne asbestos fibers poses a significant health hazard. As a result of these findings, many NASA facilities have implemented extensive asbestos-abatement programs as a preventive measure.

One of the NASA facilities involved in an asbestos-abatement program is the Goldstone Deep Space Communications Complex (GDSCC) described in detail in Section III of this report. The GDSCC is managed, technically directed, and operated for NASA by the Jet Propulsion Laboratory (JPL) of the California Institute of Technology, Pasadena, California.

Federal, state, and local laws governing the management of asbestos, have become so complex that a need has been created to structure programs to comply with the many regulations implementing these laws. NASA, JPL, and the GDSCC, in supporting the national goal of preserving the environment and protecting human health and safety, have adopted a position that operating installations shall maintain a high level of compliance with these laws based on a policy of prevention rather than reaction. Under supervision of JPL's Office of Telecommunications and Data Acquisition (TDA), efforts have been initiated at the GDSCC to develop and implement programs that focus on various environmental issues including asbestos control and abatement.

#### B. THE NATURE OF ASBESTOS

The term "asbestos" does not refer to a single chemical substance, but is a common generic term given to a group of diverse, naturally-occurring inorganic materials (silicate minerals). Under certain rare conditions, these minerals can crystallize abnormally into bundles of thousands of strong and flexible fibers that resemble fine threads. Asbestos, as a fibrous mineral, is mined and milled into numerous, commercially useful products.

Although the diverse asbestos minerals vary in their chemical compositions, they all show the following, commercially useful characteristics:

- (1) They do not burn (incombustibility)
- (2) They have high tensile strength
- (3) They have high flexibility
- (4) They provide good thermal and electrical insulation.
- (5) They have good noise absorption.
- (6) They are resistant to corrosive chemicals (acids, lyes, etc.).

All commercial varieties of asbestos are examples of minerals called silicates. These are minerals in which the backbone of the crystal lattice is formed by  $\text{SiO}_4$  tetrahedra. The two groups of silicate minerals that give rise to the varieties of asbestos are known mineralogically as serpentines and amphiboles (Table 1).

## C. ENVIRONMENTAL AND HEALTH PROBLEMS ASSOCIATED WITH ASBESTOS

### 1. History of Asbestos Use

Because it does not burn, asbestos has been used sporadically since the time of the ancient Greeks, more than 2,000 years ago. Some historical examples of the use of asbestos include a tablecloth woven from asbestos fibers for Charlemagne (8th century), a report by Marco Polo of the Chinese use of asbestos in gunpowder (13th century), and a purse owned by Benjamin Franklin that was woven with asbestos fibers (18th century).

Table 1. Asbestos-Forming Silicate Minerals

Silicate Mineral Name	Type of Asbestos	Common Name	Physical Characteristics	Usage in Commercial Application (%)	Where Mined
Serpentine	Chrysotile <sup>a</sup>	White Asbestos	Fine, flexible silky fibers with high tensile strength	90	Canada, USSR
Amphibole Group <sup>b</sup>					
Riebeckite	Crocidolite	Blue Asbestos	Brittle fibers	2-5	South Africa
Cumming-tonite-grunerite	Amosite <sup>c</sup>	Brown Asbestos	Brittle fibers that bond well with plastics	5-8	Transvaal, South Africa

<sup>a</sup>Most widely used form of asbestos.

<sup>b</sup>Other amphibole asbestos varieties, known as tremolite, actinolite, and anthophyllite, are rarely used in structures and commercial products.

<sup>c</sup>The name "amosite" is an acronym derived from the name of the company that mines it: Asbestos Mines of South Africa.

In modern times, the large-scale use of asbestos began about 1900 with the production of roofing coatings, and with the manufacture of fire blankets. Since then, because of the unique properties of asbestos, more than 3,600 products that contain asbestos have been produced for commercial use in the United States. Some alphabetically-listed examples of asbestos-containing materials that have been produced include acoustical ceiling tiles, asphalts, automobile brake linings, boiler insulation, cements, coatings for interior and exterior surfaces, fire-fighting equipment, floor tiles, mastics, millboard, pipes, pipe lagging, plasterboard, putties, roof shingles and tiles, ropes, spackles, theater curtains, wallpapers, and woven cloth and yarns. Thus, asbestos is nearly ubiquitous in public and industrial settings.

From the above, it may seem that asbestos-containing materials can be divided into the following two categories of products:

- (a) Category I: Textile products (woven cloth) and friable (easily crumbled or pulverized) materials. Friable asbestos materials, like sprayed-on interior coatings in buildings, offices and schools, potentially can be dangerous because by crumbling, pulverizing, or powdering they can release asbestos fibers into the surrounding environment. The various ways asbestos fibers can be dispensed within a room with a sprayed-on, asbestos-containing ceiling material is depicted in Figure 1. Asbestos insulation found in boilers at the GDSCC typically is friable.
- (b) Category II: Matrix-bonded composite products that are hard and non-friable, including roof and floor tiles, cement pipes, and transite boards. These composites, in which the asbestos fibers have been tightly bound in a matrix of cement, organic resins, or other binding materials, normally do not create an asbestos-exposure hazard. If ground, sanded, or sawed, however, these composites can release asbestos fibers into the air. Asbestos in roofing materials at the GDSCC typically is non-friable.

A list of the more common types of friable and non-friable asbestos-containing materials in use in the United States is shown in Table 2.

About 70% of all asbestos usage in the United States has been in construction materials. The U.S. use of asbestos peaked in 1973 with a consumption of slightly more than 800,000 metric tons (about 880,000 U.S. short tons). Only 11 years later, because of reports pointing to the negative impact of asbestos on human health, the use of asbestos in 1984 fell 75% to only slightly more than 200,000 metric tons (221,000 U.S. short tons). The variety of manufactured asbestos-containing products has dropped from more than 3,600 different products to only about 500 today.

## 2. History of Asbestos-Caused Diseases

Both Strabo (a Greek geographer, 64 BC to 23 AD) and Pliny the Elder (a Roman scholar, 23-79 AD) described lung sickness among slaves who wove asbestos fibers into cloth. It was not until 1927, however, that this asbestos-caused lung sickness was formally recognized and given the name "asbestosis." Thus, just as the long-term inhalation of coal and rock dust

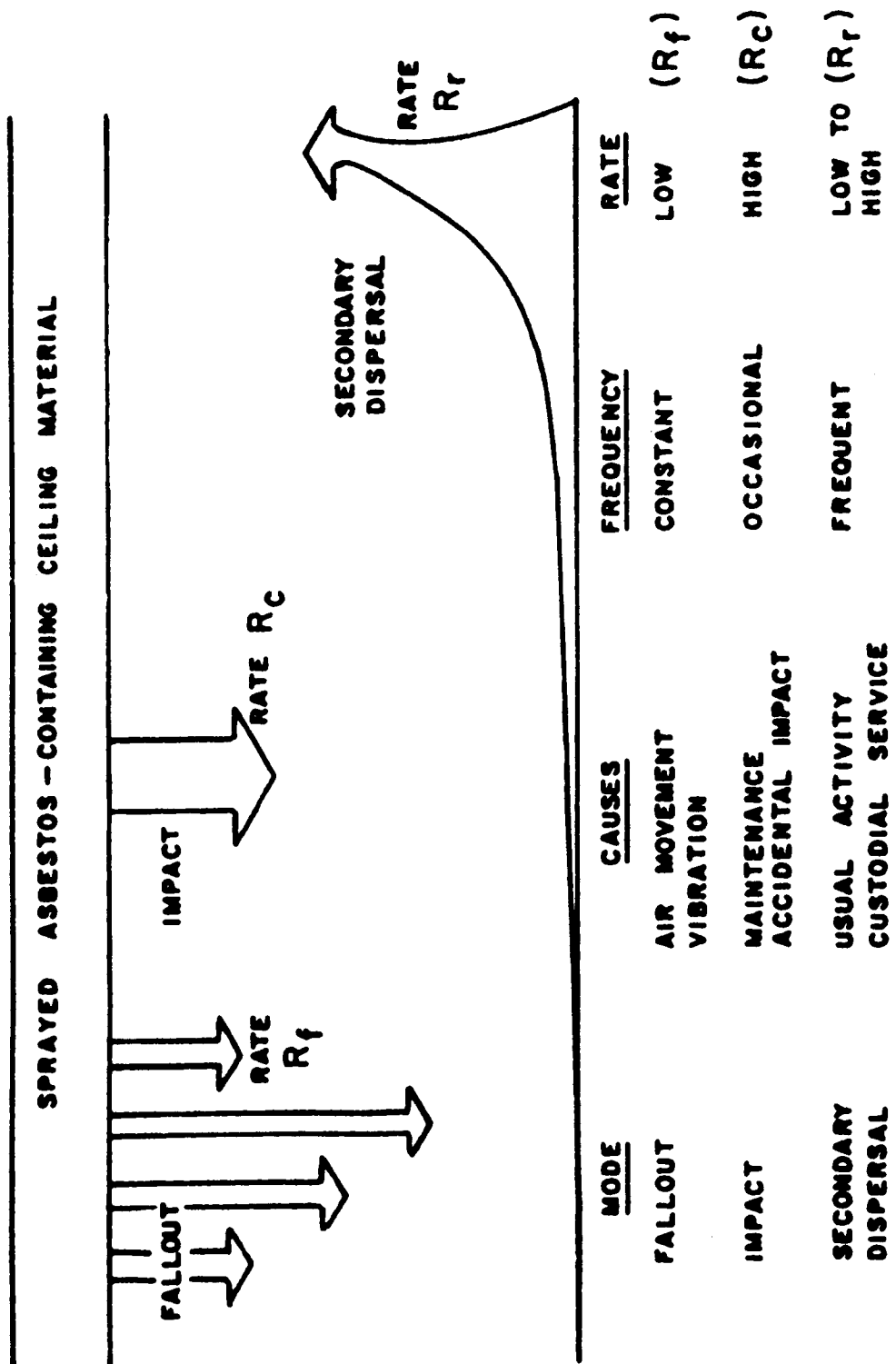


Figure 1. Modes and Rates of Asbestos Fiber Dispersal (Figure provided by National Asbestos Training Center, the University of Kansas, Lawrence, Kansas.)



Table 2. Various Types of Friable and Non-Friable Asbestos Materials and Products (as of 1977)<sup>a</sup>

Subdivision	Generic Name	Asbestos Content (%)	Dates of Use in Commerce	Binder/Sizing
Friable insulation	spray-applied insulating material	1-95	1935-1970	sodium silicate, portland cement, organic binders
Preformed thermal insulating products	batts, blocks, and pipe covering			
	85% magnesia	15	1926-1949	magnesium carbonate
	calcium silicate	6-8	1949-1971	calcium silicate
Textiles	cloth <sup>b</sup>			
	blankets (fire) <sup>b</sup>	100	1910-present	none
	felts:	90-95	1920-present	cotton/wool
	blue stripe	80	1920-present	cotton
	red stripe	90	1920-present	cotton
	green stripe	95	1920-present	cotton
	sheets	50-95	1920-present	cotton/wool
	cord/rope/yarn <sup>b</sup>	80-100	1920-present	cotton/wool
	tubing	80-85	1920-present	cotton/wool
	tape/stripe	90	1920-present	cotton/wool
	curtains <sup>b</sup>			
	(theatre, welding)	60-65	1945-present	cotton

<sup>a</sup>Source is U.S. Environmental Protection Agency, Guidance for Controlling Friable Asbestos-Containing Materials in Buildings, Office of Pesticides and Toxic Substances, EPA 560/5-83-002, March 1983, pp. C-2 and C-3.

<sup>b</sup>Laboratory aprons, gloves, cord, rope, fire blankets, and curtains containing asbestos may be common in schools.

Table 2. (Cont'd)

Subdivision	Generic Name	Asbestos Content (%)	Dates of Use in Commerce	Binder/Sizing
Cementitious concrete-like products	extrusion panels:	8	1965-1977	portland cement
	corrugated	20-45	1930-present	portland cement
	flat	40-50	1930-present	portland cement
	flexible	30-50	1930-present	portland cement
	flex. perforated	30-50	1930-present	portland cement
	laminated	35-50	1930-present	portland cement
	(outer surface)			
	roof tiles	20-30	1930-present	portland cement
	clapboard and shingles:			
	clapboard	12-15	1944-1945	portland cement
Paper products	siding shingles	12-14	unknown-present	portland cement
	roofing shingles	20-32	unknown-present	portland cement
	pipe	20-15	1935-present	portland cement
	corrugated			
	high temperature	90	1935-present	sodium silicate
	moderate temp.	35-70	1910-present	starch
	indented	98	1935-present	cotton and organic binder
	millboard	80-85	1925-present	starch, lime, clay
	smooth surface	10-15	1910-present	asphalt
	mineral surface	10-15	1910-present	asphalt
Roofing felts	shingles	1	1971-1974	asphalt
	pipeline	10	1920-present	asphalt

Table 2. (Cont'd)

Subdivision	Generic Name	Asbestos Content (%)	Dates of Use in Commerce	Binder/Sizing
Asbestos-containing compounds	caulking putties	30	1930-present	linseed oil
	adhesive (cold applied)	5-25	1945-present	asphalt
	joint compound		1945-1975	asphalt
	roofing asphalt mastics	5	unknown-present	asphalt
	asphalt tile cement	5-25	1920-present	asphalt
	roof putty	13-25	1959-present	asphalt
	plaster/stucco	10-25	unknown-present	asphalt
	spackles	2-10	unknown-present	portland cement
		3-5	1930-1975	starch, casein, synthetic resins
	sealants fire/water	50-55	1935-present	castor oil or polyisobutylene
Asbestos ebony products	cement, insulation	20-100	1900-1973	clay
	cement, finishing	55	1920-1973	clay
	cement, magnesia	15	1926-1950	magnesium carbonate
		50	1930-present	portland cement
Flooring tile and Sheet Goods	vinyl/asbestos tile	21	1950-present	polyvinylchloride
	asphalt/asbestos tile	26-33	1920-present	asphalt
	sheet goods/resilient	30	1950-present	dry oils
Wall Covering	vinyl wallpaper	6-8	unknown-present	---
Paints & Coatings	roof coating	4-7	1900-present	asphalt
	air tight	15	1940-present	asphalt

gives rise to a disease called silicosis (black lung) in coal miners, the long-term inhalation of asbestos fibers irritates the lungs and leads to asbestosis among asbestos workers.

The relationship between asbestos and disease became more complex in 1949, when a medical report was published that linked asbestosis with lung cancer. The report pointed out that there was a greater incidence of lung cancers proportionately among patients with asbestosis than among the general population.

Nor was this all. In the 1960s, studies among asbestos workers in South Africa showed a great increase in the number of patients with mesothelioma, a previously extremely rare form of cancer. Almost exclusively, mesothelioma victims were shown to be individuals who had been exposed to asbestos 30 to 40 years before the cancer's symptoms had become evident. There is a long latent period between exposure to asbestos and the manifestation of clinical symptoms of mesothelioma. Steve McQueen, the well-known actor, was a victim of mesothelioma.

Thus, asbestos now is known to be involved in three major diseases: asbestosis, lung cancer, and mesothelioma. Since asbestos fibers can scar lung tissue, and cigarette smoke interferes with the normal function of lung tissue, it is not surprising that individuals who have been exposed to high concentrations of asbestos and who also smoke are about 50 times more likely to develop lung cancer than is a non-smoker exposed to ambient low-level concentrations of asbestos. The incidence of lung cancer in workers exposed to asbestos would be markedly reduced if the workers did not smoke cigarettes.

Asbestos workers are not the only population at risk. Excess malignancies have been found in persons living and working in proximity to asbestos manufacturing facilities and in households of asbestos workers.

#### D. GENERAL CHARACTERISTICS OF ASBESTOS-CAUSED DISEASES

The unique properties of asbestos that enhance its commercial usefulness are the same properties that make it hazardous to humans.

Asbestos fibers are hazardous to health when breathed into the lungs because of the following three properties:

- (1) Asbestos fibers can splinter into smaller and smaller fibrils until they become so tiny they only can be detected with optical and electron microscopes. The fibers can become smaller than red blood cells or bacteria and can easily penetrate through the nasal passages into the lungs.
- (2) Because of their microscopically small size, asbestos fibers can remain suspended in air for hours or days after any disturbance (sweeping, dusting, etc.) has resulted in recirculation of previously settled and accumulated fibers back into the air.
- (3) Because of their chemical inertness and physical aspect ratio (much longer than their diameters), asbestos fibers are resistant to efforts by the body's immune system to remove them from the body.

## 1. Inhalation and Ingestion of Asbestos Fibers

The breathing in (inhalation) of asbestos fibers now is definitely linked to the development of three diseases: asbestosis, lung cancer, and mesothelioma. At present, there is no definite evidence that asbestos fibers that are ingested through food and drinking water are responsible for cancers of the mouth, larynx, esophagus, stomach or the gastrointestinal tract. This is a matter of concern, however, because since 1930 about 200,000 miles of asbestos cement pipes have been installed in the United States for the transmission and distribution of drinking water supplies. During their lifetimes, some Americans ingest far more asbestos fibers in their drinking water than they inhale.

Once asbestos fibers are inhaled, they can become embedded in lung tissue where they remain, presumably, for the lifetime of an individual. The greater the concentration of asbestos to which the individual has been exposed, the greater the risk of developing an asbestos-caused disease.

## 2. Relationship between Type of Asbestos Fibers and Disease

All types of asbestos, whether the serpentine mineral (chrysotile) or the amphibole minerals (amosite or crocidolite) can cause disease. There is controversial evidence that indicates that chrysotile, the most commonly used form of asbestos, may be less involved in the development of mesothelioma than are the amphibole minerals. Chrysotile, however, is just as potent as the amphiboles in causing lung cancer, a much more common form of cancer than mesothelioma.

## 3. Theories as to How Asbestos Fibers Cause Disease

At present, although there are numerous theories and speculations, it is not known how asbestos causes disease. Some researchers claim the deleterious effects of asbestos fibers are due to the physical nature of the asbestos fibers rather than to their chemical composition. The size of the fibers seems to be important. The aspect ratio of a fiber (ratio of a fiber's length to its diameter) may play a key role. Thus, it has been reported in experiments with rats that particular fibers, with a diameter less than  $0.25\mu\text{m}$  and a length greater than  $8\mu\text{m}$ , were closely connected to the development of mesothelioma.

If it is true that the harmful effects of asbestos arise because the fibers act as slender, microscopically small "arrows," then fibers that have been proposed as substitutes for asbestos (borosilicate glass, potassium titanate, silicon carbide, zeolites and some aluminum compounds) also should give rise to mesotheliomas if their fibers also have high aspect ratios. There are some experiments to indicate that this, indeed, is the case.

Other researchers claim that asbestos fibers exert their harmful effects because their specific chemical compositions alter the surface chemistry of cell membranes. This suggests that if asbestos minerals could be modified chemically they may become "safe fibers" and no longer be harmful. This concept now is under experimental investigation.

## E. ASBESTOS-CAUSED DISEASES

### 1. Asbestosis

Asbestosis usually results after exposure to high concentrations of asbestos fibers over a long period of time (15 to 35 years). The lungs become scarred as a result of the body's reaction to the asbestos fibers embedded in the lung tissue. The disease is progressive and continues to worsen even after the victim no longer is exposed to asbestos. Asbestos victims are at high risk to develop lung cancer.

The Environmental Protection Agency (EPA) has compiled information revealing that the risk of asbestosis is negligible at exposure levels below those allowed for asbestos workers. Some scarring of lung tissue may appear on X-rays after many years of low exposure, but no impairment of respiratory function is likely to occur.

### 2. Lung Cancer

Lung cancer accounts for more than half of the deaths of individuals who have been exposed to asbestos. Most asbestos-caused lung cancers become manifest after age 45. Smoking increases the risk. A 1-pack/day cigarette smoker exposed to asbestos increases by 50-fold his risk of getting lung cancer as compared to a non-smoker. By smoking 2 to 3-packs/day, a cigarette smoker increases the risk to 90-fold that of a non-smoker. Asbestos workers are not the only population at risk. Excess malignancies have been found in persons living and working in proximity to asbestos manufacturing facilities and also in households of asbestos workers.

### 3. Mesothelioma

Mesothelioma is a cancer of the tissues that line either the lung (pleural mesothelioma) or the abdomen (peritoneal mesothelioma). It is an extremely rare form of cancer in individuals who have not been exposed to asbestos. The cancer has a long latency period of 25 to 40 years between exposure to asbestos and the appearance of symptoms. There is no cure for mesothelioma and victims usually die within a year after the disease is diagnosed. There is no apparent relationship between smoking and mesothelioma as there is between smoking and lung cancer for asbestos-exposed individuals.

In contrast to the EPA's finding that the risk of asbestosis is negligible at exposure levels below those allowed for asbestos workers, the incidence of lung cancer and mesothelioma exceeds baseline rates even at very low exposure levels. This conclusion is supported by the increased incidence of lung cancer for workers experiencing the equivalent of five year's exposure to airborne asbestos at the current Federal workplace standard. In addition, mesothelioma has been found in persons whose only known exposure to asbestos was from living in a household with asbestos workers or living in the neighborhood of asbestos mines, mills, or processing facilities.

#### 4. Gastrointestinal Cancers

Medical data also indicate an increased incidence of cancers of the stomach and intestinal tract (gastrointestinal cancers) among asbestos workers as compared to individuals not exposed to asbestos. This suggests these esophagus, stomach, colon and other cancers may arise from ingestion of asbestos fibers in food and drink. At present, although there is no strong medical evidence to support this suggestion, some research is underway to investigate this possible relationship. The EPA now is considering whether to set a standard for asbestos fiber concentrations in drinking water as it has done for asbestos fiber concentrations in air.

#### 5. Potential Health Risk as a Function of Airborne Asbestos Levels and Exposed Population Exposure

It now is believed that any level of exposure to airborne asbestos involves some health risk, although the exact degree of risk cannot be reliably estimated. The risk of cancer is of greater concern at low exposure levels than the risk of asbestosis. The presence of asbestos-containing materials in the work environment represents a potential for exposure and risk of asbestos-related disease that cannot be ignored. The decision whether or not to remove asbestos is a management decision that must be balanced against the risks.



## SECTION II

### REGULATIONS THAT GOVERN MANAGEMENT OF ASBESTOS

#### A. INTRODUCTION

The Environmental Protection Agency (EPA), the Federal Occupational Safety and Health Administration (OSHA), and the California Department of Industrial Relations, Division of Occupational Safety and Health (DOSH) regulate the use, handling, and disposal of asbestos-containing materials. The EPA regulations are directed toward:

- (1) Application of asbestos-containing materials in both new and remodeled buildings.
- (2) Identification and removal of asbestos in schools.
- (3) Regulation of air emissions generated from handling asbestos-containing materials.
- (4) Regulation of disposal of asbestos-containing materials.

Workplace safety and worker protection are regulated by Federal OSHA. Individual states, however, may operate their own OSHA programs. California operated its own Federally-approved OSHA program (Cal/OSHA) until July 1, 1987. The dissolution of Cal/OSHA resulted from the intentional failure of California Governor George Deukmejian to reauthorize funding for the agency. The legality of the Governor's action was challenged in court, and in October 1987, a California State Appeals Court unanimously ruled that Governor Deukmejian acted illegally in his unilateral abolishment of the Cal/OSHA program. The court has ordered the Cal/OSHA program to be reinstated.

The M. B. Gilbert Associates (MBGA) advises the GDSCC to follow this issue until it is resolved, because reactivation of Cal/OSHA would result in a change in procedural requirements for asbestos management.

When the program was terminated in July 1987, the standards of the Cal/OSHA program substantially were the same as the Federal OSHA standards. The primary difference was Cal/OSHA's requirement for the registration of carcinogen users. Carcinogen user registration now must be reported to the California Division of Occupational Safety and Health (DOSH).

In addition to the above EPA and OSHA environmental requirements, NASA has issued its own technical bulletins, guidelines, and memoranda. In the past, NASA guidelines have been more stringent than some of the Federal guidelines.

#### B. FEDERAL REGULATIONS

In 1973, EPA, under the Clean Air Act, National Emission Standards for Hazardous Air Pollutants (NESHAPS), began issuing bans on the application of asbestos-containing materials in buildings. By 1978, the ban included

asbestos-containing spray-applied insulation (SAI) for insulation and fire-proofing purposes, and spray-applied decorative materials (decorative textured ceiling applied to gypsum board). These regulations are found in 40 Code of Federal Regulations (CFR), parts 61.145 through 61.147. There presently are no bans on the use of asbestos-containing materials in roofs and boilers.

The regulations are designed to prevent emissions to the outside air as a result of demolition and renovation activities. Notification requirements and emission control criteria are stipulated in the regulations. Packaging, labeling and disposal of waste asbestos also are addressed.

In 1972, Federal OSHA began issuing asbestos-related regulations designed to protect the worker and workplace from asbestos exposure. The standards, which are found in 29 CFR 1910 and 29 CFR 1926, address reporting requirements, airborne exposure concentrations for asbestos workers, engineering and administrative controls, workplace practices, medical surveillance, and worker protection requirements.

Prior to July 21, 1986, the permissible exposure limit (PEL) for asbestos fibers was 2.0 fibers per cubic centimeter (f/cc) for fibers greater than five micrometers in length. The 2.0 f/cc standard was a time-weighted average (TWA) for an 8-hour work day, 40-hour work week. In addition to the PEL, a ceiling limit of 10 f/cc and an action limit of 0.2 f/cc were established. On July 21, 1986 a new standard became effective that reduces the PEL to 0.2 f/cc TWA, the ceiling limit to 2.0 f/cc, and the action limit to 0.1 f/cc. The new standard also distinguishes between general industry and construction requirements. Under OSHA requirements, states must adopt rules at least as stringent as the Federal requirements within six months of promulgation of the Federal rules. This means that California is presently subject to the new Federal OSHA standards.

## C. CALIFORNIA REGULATIONS

### 1. Water Quality Requirements: Lahontan Regional Water Quality Control Board

The GDSCC is under the jurisdiction of the Lahontan Regional Water Quality Control Board (LRWQCB). The LRWQCB enforces regulations to protect the waters of the state of California under the California Administrative Code (CAC), Title 23, Subchapter 15. At this time, the regional board does not have a limit for discharge of asbestos to ground or surface waters. If demolition or abatement activities take place at the GDSCC, care should be taken to prohibit fibers from entering septic tank or pond systems. This could be construed to constitute disposal of a hazardous waste, even though the regional board has not set discharge limits.

An extension of the water quality requirements are the reporting requirements found in the Safe Drinking Water and Toxic Enforcement Act of 1986 (The California Administrative Code, Title 26, Chapter 6.6). By 1988, persons responsible for the release or threatened release of asbestos into the drinking water supply will be required to report such releases to agencies and the affected community. At the present time, Federal facilities are not subject to Title 26, Chapter 6-6. There is activity in the state legislature, however, to eliminate this exemption.

2. Air Quality Requirements: San Bernardino Air Pollution Control District (SBAPCD)

The GDSCC is under the jurisdiction of the San Bernardino Air Pollution Control District (SBAPCD). The District's Rule 1002 - Emission Standard for Asbestos is substantially the same as the Federal NESHAPS requirements. EPA has given local air pollution control agencies primary authority to enforce asbestos and other air pollution regulations. In states with their own programs, however, notifications must be made to the local agency as well as the EPA.

3. Hazardous Waste Requirements: California Department of Health Services

The California Department of Health Services (DHS) has classified asbestos-containing material as a hazardous waste, if the percent by weight of asbestos exceeds one percent. This is stipulated in the CAC, Title 22, Chapter 30, Articles 9 and 11. All other requirements for the handling and disposal of a hazardous waste under Title 22 also apply to asbestos. Current guidance from the DHS on the disposal of asbestos is as follows:

- (1) The contractor or owner (preferably the owner), as a generator of asbestos waste, must obtain an EPA Generator's Identification Number.
- (2) The asbestos-containing material may be disposed of at either a Class I or a designated Class II landfill.

Because asbestos is a hazardous waste, it must be packaged, labeled, marked, and transported in accordance with the Federal Department of Transportation regulations found in 49 CFR 172 in addition to any regulations from CAC, Title 22.

4. California OSHA

Cal/OSHA regulations on asbestos are found in CAC, Title 8, Section 5208. The state regulations were as stringent as the Federal OSHA regulations until the July 21, 1986 Federal amendments were promulgated. These amendments reduced the PEL from 2.0 f/cc to 0.2 f/cc. Recently, California issued a proposed rule to reduce the PEL from the current standard of 2.0 f/cc to 0.1 f/cc. The proposed ruling did not pass. It was greatly opposed by industry as being a standard too difficult, if not impossible to meet. As a result, California technically is subject to the Federal rule until it adopts a PEL that is at least as stringent as the Federal PEL.

Cal/OSHA standards are substantially the same as Federal standards (except as discussed above). Because Cal/OSHA has been given primary authority for enforcing asbestos and other health and safety regulations, notifications are made directly to Cal/OSHA. Because asbestos regulations are changing so rapidly, it is recommended that both the Federal and state OSHA requirements be monitored regularly to prepare for anticipated stricter standards.

## 5. Local Requirements: Roofing

The GDSCC is under the jurisdiction of the San Bernardino County Building Code enforced by the San Bernardino County Office of Building and Safety. The building code has requirements on the number and type of roll-composite roofs allowed to be applied over an existing roof (Building Code, Chapter 32 Section 3(d)(2) and its Appendix). This section of the building code is extremely complex with a number of exceptions to the rule. The rule in its simplest form allows for one application of roofing on a structure. The criteria that allow more than one application of roll-composite roofing are stringent and are difficult to fulfill.

## D. NASA GUIDANCE

On February 18, 1983, the NASA Occupational Health Office, in conjunction with the Facilities Division, issued guidelines for asbestos hazard-assessment and abatement (see Appendix L). The guidelines apply primarily to spray-applied insulation (SAI) and are scheduled for update this year. The updated version is anticipated to parallel the Federal OSHA regulations and EPA guidelines. The NASA Occupational Health Office has recently told M.B. Gilbert Associates (MBGA) that permissible asbestos exposure levels established by NASA would most likely be equivalent to the current Federal OSHA levels.

## E. SUMMARY OF ASBESTOS REGULATIONS

Federal OSHA and NESHAPS asbestos rules have been designed to protect those persons who remove asbestos from buildings and who live near or work in the asbestos industry. The rules also include standards to reduce exposure to airborne asbestos. There are no existing Federal rules that directly address protection of persons occupying buildings from exposure. Review of these rules show that they address outdoor air levels, with no application to indoor levels.

EPA, on the other hand, under the Toxics Substances Control Act (TSCA) has begun to address the problem of indoor asbestos levels by issuing its rules on identification of asbestos in schools. It also has issued its restrictions on the application of asbestos-containing materials in new or remodeled buildings (under NESHAPS as authorized in the Clean Air Act). In addition, EPA has issued rules on the emission of asbestos fibers from the handling of asbestos in the asbestos industry and the disposal of asbestos-containing waste.

Additional bans related to asbestos mining and manufacturing are anticipated to be promulgated by EPA. It also is anticipated that certain uses of asbestos will be banned, and perhaps removal of specified asbestos products will be required as well. One area to consider is any future installation of new transite piping. New rules could be issued to prohibit both the installation of new transite water piping and the continued use of existing transite water piping. If this should occur, facilities could be required to discontinue use of old pipes, and lay new pipes that do not contain asbestos.

A bibliography of pertinent regulatory documents dealing with asbestos is presented in Section X.

## SECTION III

### THE GOLDSTONE DEEP SPACE COMMUNICATIONS COMPLEX (GDSCC)

#### A. LOCATION OF THE GDSCC

The Goldstone Deep Space Communications Complex (GDSCC) is located in a natural, bowl-shaped depression in the Mojave Desert, in San Bernardino County about 45 miles north of Barstow, California, and about 150 miles northeast of Pasadena, California, where the Jet Propulsion Laboratory (JPL) is located.

The GDSCC is part of the National Aeronautics and Space Administration's (NASA) Deep Space Network (DSN), one of the world's largest and most sensitive scientific telecommunications and radio navigation networks. The Goldstone Complex is managed, technically directed, and operated for NASA by the Jet Propulsion Laboratory of the California Institute of Technology in Pasadena, California. The primary purpose of the DSN is to support the tracking of both manned and unmanned spacecraft missions and to provide instrumentation for radio and radar astronomy in the exploration of the solar system and the universe (see Section III, B below).

The 52-square-mile Goldstone Complex lies within the western part of the Fort Irwin Military Reservation. A Use Permit for the use of the land was granted to NASA by the U.S. Army (Figure 2). The Complex is bordered by the Fort Irwin Military Reservation on the north, east and southeast, the China Lake U.S. Naval Weapons Center on the northwest, and state and Federal lands managed by the U.S. Bureau of Land Management (BLM) on the south.

#### B. FUNCTIONS OF THE GDSCC

After the Space Act of 1958 had accelerated U.S. plans and programs for space exploration, JPL initiated construction work at Goldstone to build the first tracking station of what is now known as the Deep Space Network (DSN). In support of DSN operations, Goldstone performs the following functions:

- (1) Tracking: Locating the spacecraft, measuring its distance, velocity and position, and following its course.
- (2) Data Acquisition: Gathering information coming in from the spacecraft.
- (3) Command: Sending of instructions from the ground that guide the spacecraft in its flight to the target. Commands also tell the spacecraft when to perform required operations, including the switching on and off of instruments for performance of the mission's scientific experiments.

Goldstone also is a research and development center to extend the communication range and to increase the data acquisition capabilities of the DSN. It serves as a proving ground for new operational techniques. Prototypes of all new equipment are thoroughly tested at Goldstone before they are duplicated for installation at overseas stations (see Section III, C below).

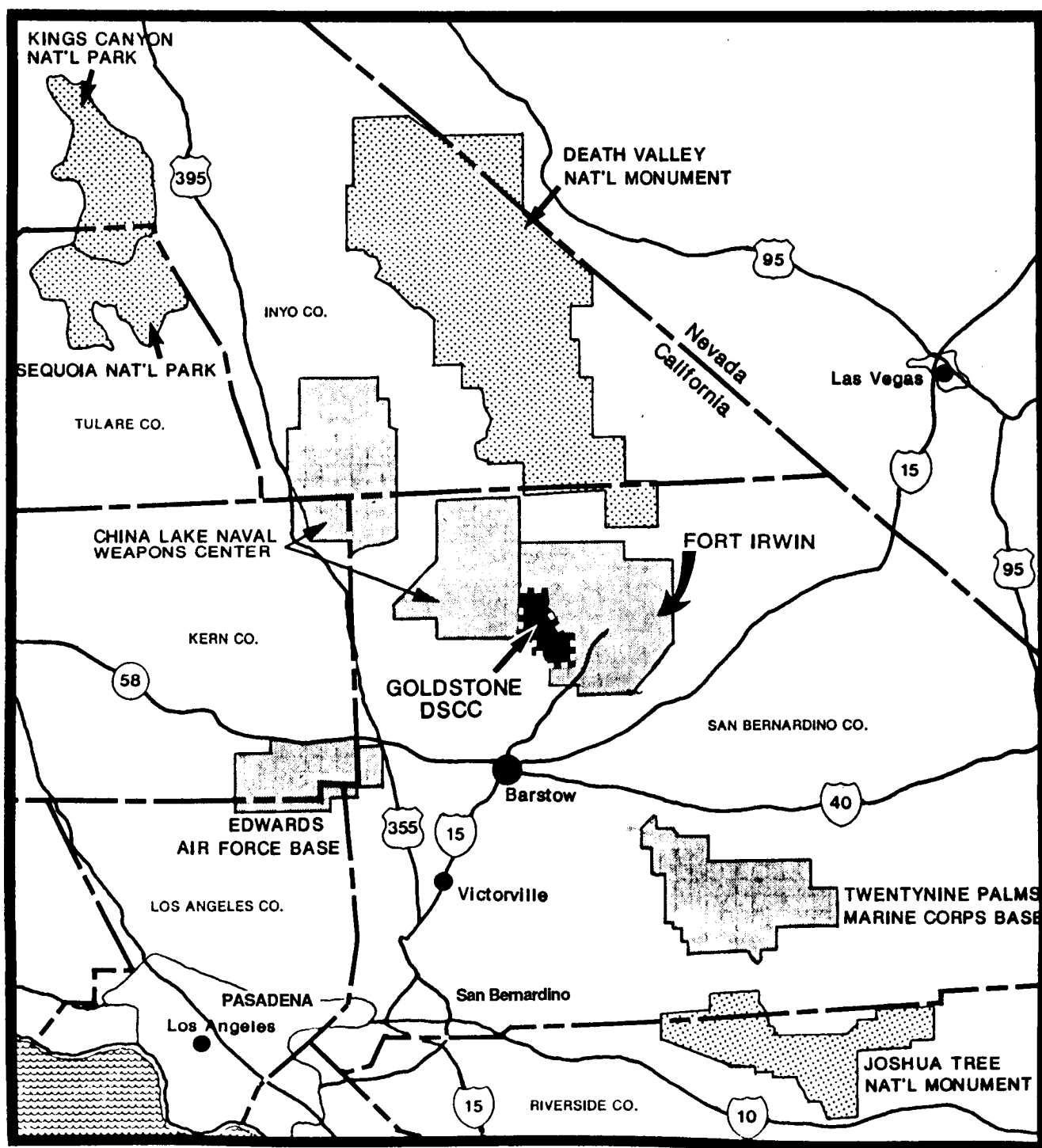


Figure 2. Geographic Relationship of the Goldstone Deep Space Communications Complex to JPL in Pasadena

### C. FACILITIES AT THE GDSCC

The GDSCC is a self-sufficient, working community with its own roads, airstrip, cafeteria, electrical power, and telephone systems and is equipped to conduct all necessary maintenance, repairs, and domestic support services. Facilities at the GDSCC include about 100 buildings and structures that were constructed during a 30-year period from the 1950s through the 1980s.

About 38 percent of these buildings and structures contain asbestos-containing materials, the majority of which is present in non-friable form such as floor tile, roofing paper, transite wallboard, underground transite water pipe, and telephone wire conduit. Friable asbestos is found in pipe and boiler insulating materials.

The construction of additional buildings and structures continues today as the GDSCC increases its activities and operations.

Goldstone is one of three Deep Space Communications Complexes (DSCCs) operated by NASA/JPL that are located on three continents: at Goldstone in Southern California's Mojave Desert; in Spain, near Madrid; and at Tidbinbilla, in Australia, near Canberra. Because these three DSCCs are approximately 120 degrees apart in longitude, a spacecraft always is in view of one of the DSCCs as the Earth rotates on its axis (Figure 3).

Activities at the GDSCC operate in support of six, large, parabolic dish antennas, at sites called Deep Space Stations (DSSs): four DSSs are operational, one is devoted to research and development (R&D) activities, and one has been deactivated. There also are four, similar, operational DSSs in Spain and in Australia. Thus, the NASA DSN consists of a worldwide network of 12 operational DSSs. A seventh parabolic dish antenna at Goldstone is operated by the National Oceanic and Atmospheric Administration (NOAA).

Operation and maintenance of these antennas at the GDSCC result in the use of hazardous chemical substances and the generation of hazardous wastes. It was reported in 1985, that 20 tons of hazardous wastes were generated at the GDSCC, including waste oils, cleaning solvents, antifreeze, acids and bases, spent batteries, paints, and thinners. A large portion of these was transported off-site for recycling. The remainder went off-site to permitted hazardous waste disposal facilities. The GDSCC also operates an on-site Class III solid-waste landfill. This facility is permitted to receive non-hazardous solid waste generated at the GDSCC, including garbage, grass and tree clippings, construction debris, paper materials.

Total facilities at the GDSCC (Figure 4) include the six large, parabolic dish antennas, an airport, a microwave test facility, miscellaneous support buildings, and a remote support facility in Barstow. The GDSCC support staff consists of 246 personnel onsite and 55 personnel located at the Barstow facility. Table 3 summarizes the major facilities, buildings (number and square footage), and antennas (construction date and size). Three sites within the GDSCC have antennas (referred to as stations) devoted to NASA operations (Echo Site, Mars Site, and Apollo Site). Two other sites have antennas devoted to research and development: (Venus, operated by the GDSCC, and Mojave, operated by the National Oceanic and Atmospheric Administration).

ORIGINAL PAGE IS  
OF POOR QUALITY

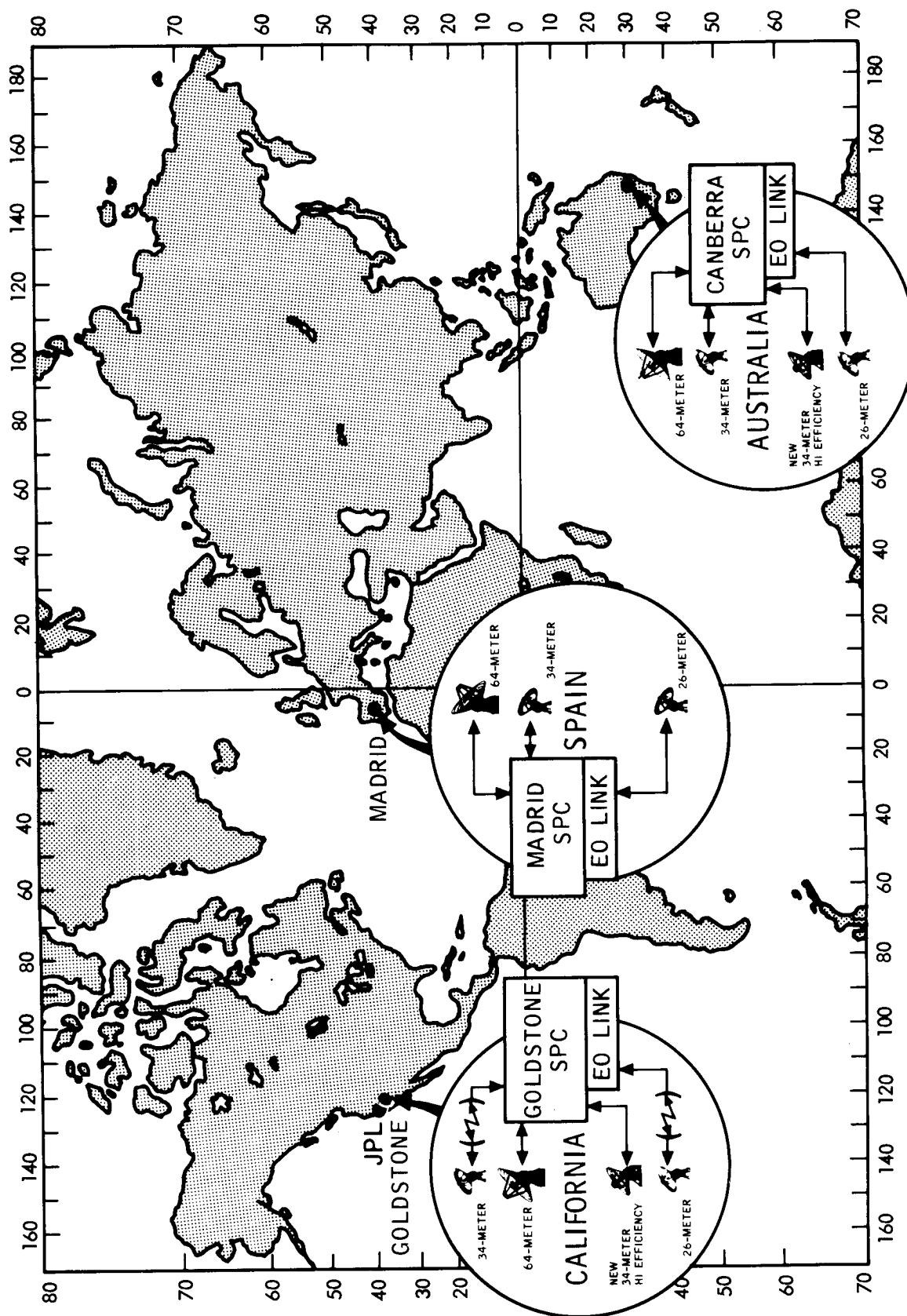


Figure 3. The Three-Continent NASA Deep Space Network as it Existed in 1986



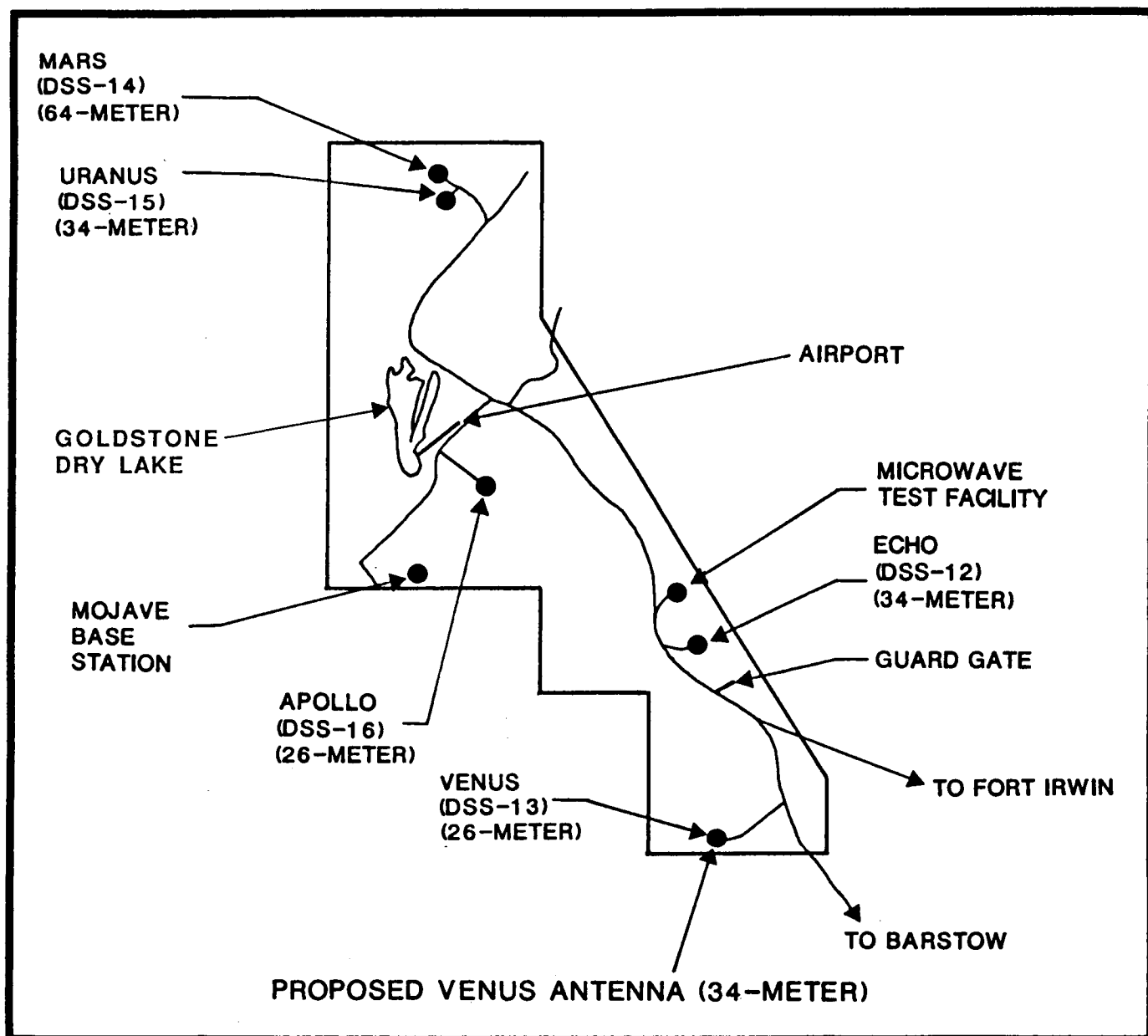


Figure 4. Schematic Map of the Goldstone DSCC Showing Locations of the Six NASA Deep Space Stations (DSSs)

Table 3. Major Facilities at the GDSCC

Site	Station Number	Buildings		Antennas	
		Number	SF (ft <sup>2</sup> )	Date of Construction	Size (Meters)
Echo Site	DSS-12	24	86,662	1961 <sup>a</sup>	34
Venus Site	DSS-13	12	12,502	1962 <sup>b</sup>	26 9
Mars Site	DSS-14 DSS-15	11	36,834	1966 1984	64 34
Apollo Site	DSS-16	23	43,985	1965 <sup>c</sup>	26 9
Mojave Site		5	11,850	1964	12 <sup>d</sup>
Airport <sup>e</sup>		2	710	1963/1970	--
Microwave Test Facility	MTF	1	2,880	1963	--
Miscellaneous	--	3	1,430	--	--
Barstow Facility <sup>f</sup>		1	28,343	--	--

<sup>a</sup>Original antenna, built in 1959, was moved to Venus Site in 1962. A new 26-meter antenna, built in 1961, was extended to 34 meters in 1978.

<sup>b</sup>Antenna was constructed at Echo Site in 1959 and moved to the Venus Site in 1962.

<sup>c</sup>Antenna originally was constructed for the NASA Goddard Space Tracking and Data Network. JPL/GDSCC/DSN operation of the antenna began in October 1984.

<sup>d</sup>This antenna is operated by the National Oceanic and Atmospheric Administration (NOAA).

<sup>e</sup>The airport is located at the Goldstone Dry Lake.

<sup>f</sup>This site is located in Barstow, California about 45 miles southwest of the GDSCC.

Source: Jet Propulsion Laboratory and National Aeronautics and Space Administration, 1985.

A 26-meter (85 foot) antenna, located at the Pioneer Site was deactivated in 1981. In 1985, the Pioneer antenna was designated a National Historic Landmark by the U.S. Department of Interior and the Pioneer Site was returned to the U.S. Army. Each of the Goldstone sites is briefly described below.

#### D. ANTENNA STATIONS AT THE GDSCC

##### 1. Echo Site (DSS-12)

The Echo Site, as the administration center and operations headquarters of the GDSCC, is the most extensively developed site on the complex. It has one 34-meter antenna and 24 support buildings having a combined area of 86,622 ft<sup>2</sup> (SF). Support buildings include administration and engineering offices, cafeteria and dormitory facilities, transportation and maintenance facilities, storage areas, and warehouses. Echo Station originally was built in 1959 as a 26-meter (85 foot) antenna. The antenna was first used in 1960 in support of the Echo Project, an experiment to transmit voice communications coast-to-coast by bouncing radio signals off the reflective Mylar surface of a passive balloon-type satellite. In 1962, this original 26-meter antenna was moved to the Venus Site. In anticipation of this move, a newer 26-meter antenna had been built at the Echo Site in 1961. In 1978, this antenna was enlarged to 34 meters (111.5 ft).

##### 2. Venus Site (DSS-13)

The Venus Site consists of a 26-meter (85 ft) antenna and 11 buildings having a combined area of 12,502 SF. The support buildings provide space for operations control, laboratories, offices, security, workshops, warehouses, and mechanical equipment. The 26-meter antenna, which was originally located at Echo Site, was moved to the Venus Site in 1962. The antenna was used for a radar astronomy study of the planet Venus. Currently, its primary function is research and development and performance and reliability testing of very high power radio-frequency transmitters and new systems and equipment prior to their introduction into the Deep Space Network. A new 34-meter (111.5 ft) antenna has been proposed to replace the 26-meter antenna.

##### 3. Mars Site (DSS-14 and DSS-15)

The Mars Site consists of 2 antennas and 13 buildings with a combined area of 36,834 SF. The support buildings provide facilities for operations control, offices, training, mechanical equipment, storage, and security.

The Mars Station Antenna (DSS-14), at 64-meters (210 ft) in diameter, is one of the larger antennas of its kind in the world. The antenna, which was constructed in 1966, is 6.5 times more powerful and sensitive than a 26-meter antenna, extending the range of deep space communications by 2.5 times. It can maintain communications with spacecraft even to the edge of the solar system. Standing more than 234 ft high, this antenna is one of the most striking features in the geographic area. Plans include the extension of the 64-meter parabolic dish to 70 meters in time to be ready for the Voyager 2 spacecraft's encounter with the planet Neptune in August 1989.

The Uranus Station Antenna (DSS-15) is a 34-meter, high efficiency (HEF) antenna, located approximately 1,600 ft southeast of the Mars Station Antenna. Built in 1984, this latest antenna-addition at the GDSCC first was used to support the encounter of the Voyager 2 spacecraft with the planet Uranus in January 1986.

#### 4. Apollo Site (DSS-16)

The Apollo Site has a 26-meter (85-ft) antenna and 18 buildings having a combined area of 43,985 SF. The buildings provide space for operations, equipment, storage, and warehousing. The antenna was originally constructed in 1965 by the NASA Goddard Space Tracking and Data Network to support the manned Apollo missions to the moon. Operation of the antenna under the JPL/GDSCC DSN began in October 1984. The antenna now is used to support the missions of the Space Shuttle (STS) and satellites in both low and high Earth orbits.

#### 5. Mojave Base Site (NOAA Antenna)

The Mojave Site has five buildings with a combined area of 11,850 SF. At one time, these buildings provided support facilities for operations, equipment, and maintenance. Except for the NOAA operations buildings, however, these buildings now are not in use.

The Mojave Base Station Antenna is a 12-meter (40-ft) antenna operated by NOAA. The antenna is involved in several programs including monitoring of shifts in the Earth's plates, monitoring weather changes, and retrieving information from very low orbiting Earth satellites.

### E. SUPPORT FACILITIES AT THE GDSCC

#### 1. Goldstone Dry Lake Airport

The airport consists of an approximately 6,700 ft by 100 ft paved primary runway and a 5,300 ft by 50 ft unpaved auxiliary runway. There are two buildings at the airport site, both of which are presently not in use. An open hangar is used to provide shelter for a single aircraft. For its personnel, NASA operates scheduled shuttle flights to the GDSCC that originate from the Burbank-Glendale-Pasadena Airport. In addition, the Goldstone airport is used infrequently by administrative Army flights. Both NASA and the U.S. Army use propeller-driven aircraft.

#### 2. Microwave Test Facility and Fire Training Area

The Microwave Test Facility (MTF) and Fire-Training Area consists of a single building of 2,880 SF along with areas identified for fire fighting. The MTF is used for research and development testing of antenna equipment. Fire training includes procedures for the quenching of fires.

### 3. Miscellaneous Buildings in the GDSCC Area

Three buildings and structures at the GDSCC that fall into this category include the main gatehouse, pump house, and radio spectrum monitor. Total area of these three buildings/structures is 1,430 SF.

### 4. Off-Site Facility at Barstow, California

In addition to the abovementioned onsite facilities, the GDSCC leases an office and warehouse support facility in the nearby city of Barstow. The facility is a single story, 28,343 SF structure located at 850 Main Street.

## F. PLANNED FACILITIES TO BE CONSTRUCTED AT THE GDSCC

### 1. New 34-Meter Antenna at the Venus Site (DSS-13)

The new proposed antenna at the Venus Site would replace an existing 26-meter antenna that was installed in 1962 and that no longer is used. The planned design involves a high-performance 34-meter wheel-and-track type, azimuth-elevation antenna. The proposed project (Figure 5), includes construction and installation of the antenna structure on a one-story, below-grade foundation and equipment enclosure. This also will house the mechanical drive and controls, and the optical elements.

Technical description of the proposed Venus antenna and associated components may be found in the Advanced Engineering Study Report for Design and Construction of a Beam Waveguide 34-Meter X Band AZ-EL Antenna, prepared in July 1986 by TIW Systems, Inc.

### 2. Maintenance and Integration Building at the Mars Site (DSS-14)

A 5,000 SF single-story metal prefabricated building (150 ft x 162 ft) is planned for the Mars Site. This building is suitable for housing the maintenance and integration operations and appropriate personnel. Most of these functions now are located 12 miles away at the Echo Site. The building would replace a temporary trailer currently in use at the Mars Site for the same purposes. The project will provide greater operational efficiency, an improved work environment, and reduced operational costs.

## G. NON-STRUCTURAL SUPPORT FACILITIES AT THE GDSCC

### 1. Transportation Network

The major roadways in the area are shown in Figure 6. The only surface public transportation route to the GDSCC is by the Fort Irwin Road that leads to Fort Irwin. The NASA Road cutoff from Fort Irwin Road leads into the GDSCC. NASA Road merges with Goldstone Road, which is the only north-south paved access road within the complex. Both NASA and Goldstone Roads are paved two-lane roads and are maintained by the Ft. Irwin Post Engineer. Two-lane paved access roads also lead to each of the sites and major facilities.



## 2. Utilities and Services

The Southern California Edison Company provides electricity for the Goldstone Complex. The GDSCC provides its own backup diesel-engine generators to ensure continuity of electrical service for prescheduled periods of time. Gasoline, diesel oil, and hydraulic oil are stored in underground storage tanks. Water is supplied by Fort Irwin from groundwater basin wells. Sanitary sewage is discharged to septic tank systems constructed at each site. The Echo and Mars Sites also discharge waste water to small evaporation ponds.

### H. WASTE-MANAGEMENT FACILITIES AT THE GDSCC

At the Echo Site, the GDSCC operates its own 6-acre, Class III solid-waste landfill. This facility, soon to be expanded to 10 acres, accepts only non-hazardous, solid wastes. The anticipated time to reach capacity of the expanded 10-acre facility is five years.

Most of a small quantity of hazardous waste, generated at the GDSCC each year, is sent to off-site commercial facilities for reclamation and eventual reuse. The remainder is transported to off-site commercial treatment or disposal facilities within 90 days of generation. The GDSCC maintains several properly managed waste-accumulation points, but operates no facilities requiring a hazardous waste permit. In accordance with its environmental management program, the GDSCC conducts all of its waste-management operations in strict compliance with environmental regulations, in a manner consistent with protection of human health and the environment.

### I. OPERATIONAL RELATIONSHIPS BETWEEN THE GDSCC AND FORT IRWIN

Because the GDSCC is contained within Fort Irwin, the two installations potentially can affect each other's roles and missions. Fort Irwin is a U.S. Army installation serving as the U.S. Army National Training Center (NTC). The remote desert environment allows military task forces to practice large-scale training maneuvers that could affect natural, historic, and cultural resources at the GDSCC. This especially is true when the maneuvers involve the movement of heavy equipment (tanks, large trucks) within the GDSCC. Most maneuvers occur at the eastern border of the GDSCC and every effort is made by both the GDSCC and Ft. Irwin personnel to avoid the use of sensitive areas for such maneuvers.

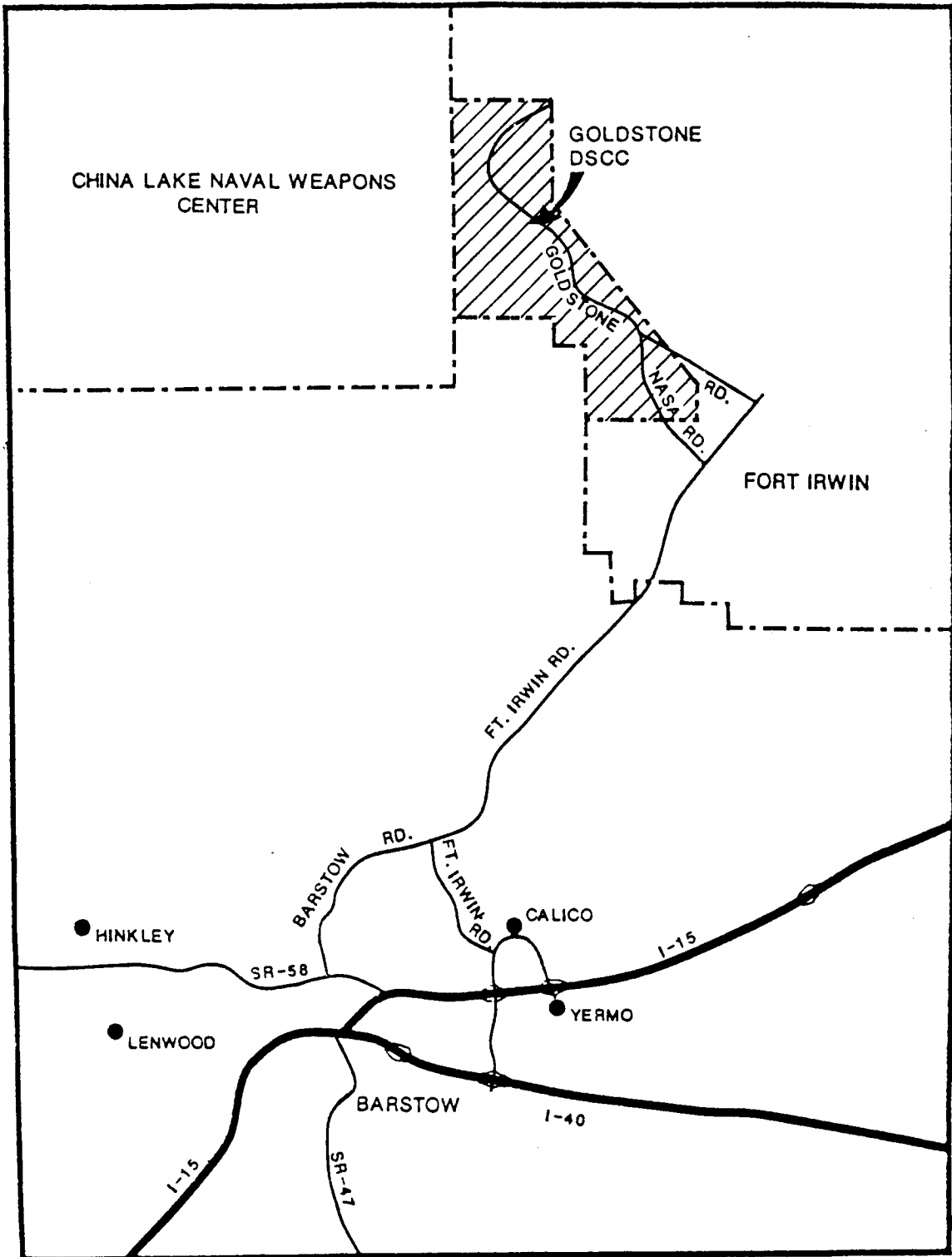


Figure 6. Major Roads Leading to and at the Goldstone DSCC



## SECTION IV

### THE ASBESTOS SURVEY AT THE GDSCC

#### A. INTRODUCTION

The NASA/JPL/GDSCC and its contractor offices in Barstow, California, recognized that many older buildings/structures at both the Goldstone and Barstow facilities could contain asbestos-containing materials. To eliminate the potential for exposure of its personnel to asbestos, the JPL/GDSCC began its implementation of its Asbestos Management/Abatement Program by contracting in June 1986 with M.B. Gilbert Associates (MBGA), Long Beach, California, to conduct a survey to locate asbestos in the buildings/structures at both the Goldstone and Barstow facilities. This asbestos survey was conducted from October to November 1986, and a report dealing with the results of this buildings/structures survey was issued by MBGA in April 1987.

A letter dated April 20, 1987, sent from Marsha Beck Gilbert, president of MBGA, to Mr. Len Kushner at JPL, dealt with the following subject:

Submittal of Abestos Survey and Management/Abatement Plan, Contract No. 957527, and Disclaimer Regarding the Asbestos Survey.

A copy of this letter dealing with this original asbestos-survey and its disclaimer is presented in Appendix K.

The original survey of asbestos-containing materials in buildings and structures at the NASA/JPL Goldstone Deep Space Communications Complex (GDSCC), Goldstone, California, excluded several types of asbestos applications, including the following:

- (1) Asbestos in roofing tiles, felts, or papers. The integrity of the roofing would have been disturbed if samples had been taken.
- (2) Asbestos insulation materials inside of boilers. A survey would have required the shut-down of the boilers to obtain samples of suspected asbestos materials.

Thus, subsequent to completion of the original buildings/structures survey, JPL made arrangements for M.B. Gilbert Associates to return to the GDSCC for a second survey to sample roofs and boilers for asbestos. This second field survey was conducted in September 1987. A separate report, dealing with the results of this roofs and boiler survey, was issued by MBGA in October 1987.

A letter dated October 29, 1987, sent from Marsha Beck Gilbert to Mr. Len Kushner, dealt with the following subject:

Submittal of Asbestos Survey of Roofs and Boilers at the Goldstone Deep Space Communications Complex, Contract No. 957527, Modification 4, and Disclaimer Regarding the Asbestos Survey.

A copy of this letter dealing with this second asbestos-survey, involving roofs and boilers of the GDSCC, is presented in Appendix K.

The two MBGA reports, describing the results of both of the above described asbestos surveys, have been combined and integrated and are presented as a single report in this present document (Environmental Projects: Volume 4).<sup>\*</sup> From this point on, therefore, the word "survey" as used in this document refers to the two separate surveys involving buildings/structures and roofs and boilers at the GDSCC.

The survey also was to determine the quantity, type, and condition of the various asbestos-containing materials at the GDSCC/Barstow facilities. The resultant information base, once compiled into a usable format, then could be used by appropriate JPL/GDSCC personnel to make informed decisions on the scheduling and budgeting of various asbestos-abatement projects.

In general, the GDSCC practices involving asbestos are conscientious and forward thinking. Care is taken to avoid worker exposure to asbestos, training of personnel has been provided, asbestos-containing wastes are restricted from disposal in the GDSCC solid-waste landfill and, when generated, are properly labeled, bagged, and disposed of at a commercial and permitted hazardous-waste landfill. A future program is planned to remove all friable asbestos that was discovered during the two surveys.

In addition to the building-by-building asbestos survey, the GDSCC has conducted a facility-wide asbestos training program as well as pulmonary function testing and respirator fit-testing for personnel who might come into contact with asbestos during their normal work activities. Details of these training programs are presented in Appendix J.

#### B. ASBESTOS-SURVEY OBJECTIVES

The asbestos-survey objectives are:

- (1) To survey the buildings/structures at the GDSCC and at the contractor office facilities in Barstow, California, to locate asbestos-containing materials. A further objective was to take samples of roofing materials and boiler insulation at 12 specified building locations to determine their asbestos content. These two objectives are to determine the type, quantity, and condition of these asbestos-containing materials.
- (2) To record findings and sample locations and to compile the data collected during the survey into a format usable by management and asbestos-abatement contractors.
- (3) To make recommendations for asbestos-abatement actions.
- (4) To summarize regulations, procedures, and options for the preparation of the proper asbestos management and abatement plans for buildings/structures and roofs and boilers.

---

<sup>\*</sup>The previous three volumes dealing with environmental compliance activities at the GDSCC are: Polychlorinated Biphenyl (PCB) Abatement Program, Final Report (Environmental Projects: Volume 1); Underground Storage Tanks Compliance Program (Environmental Projects: Volume 2); and Environmental Compliance Audit, Final Report (Environmental Projects: Volume 3).

All of the above objectives have been attained. The resultant findings, compiled data, drawings, recommendations, and plans are presented in this report.

### C. SCOPE OF THE ASBESTOS SURVEY

#### 1. Selection of Buildings and Structures to be Investigated

The buildings to be surveyed included all buildings contained in the Directory of Goldstone Buildings and Facilities, December 1985 edition, (Gold Book), with the following exception:

- (1) The Pioneer Site buildings and structures. The U.S. Army (Ft. Irwin) has assumed responsibility for these facilities.

#### 2. Selection of Roofs and Boilers of Specific Buildings to be Investigated.

Roofs surveyed were those at Buildings G-23, G-26, G-33, G-38, G-51, G-53B, G-58, G-60, G-72, G-81, and G-86. Boilers surveyed were those located in Buildings G-21, G-23, G-26, G-33, G-38, G-51, G-72, and G-86.

#### 3. Asbestos Uses Included in the Survey of Buildings/Structures at the GDSCC

The uses of asbestos to be surveyed were those applications in flooring and roofing (except as described below); interior and exterior walls, ceiling tile, and ceilings (including sprayed-on applications); interior and exterior pipes, ducts, boilers, and other insulated equipment (except as described below); asbestos materials in storage pending use or disposal; and miscellaneous uses of asbestos noted during the course of the survey.

It was established prior to initiation of the field survey that certain asbestos uses would not be surveyed. These uses are listed below:

- (1) Asbestos used in underground piping.
- (2) Other underground occurrences of asbestos.
- (3) Asbestos use in gaskets, where equipment would have to be disassembled to collect a sample.
- (4) Valve gland packings, sealants, lubricants or similar materials used in equipment at the GDSCC.
- (5) Asbestos-wrapped piping and other concealed asbestos materials in walls, where wall materials would require removal or destruction to obtain samples.
- (6) Asbestos in flooring tiles, felts, or papers, where the integrity of the flooring would be disturbed if samples were taken.

- (7) Asbestos in roofing tiles, felts, or papers, where the integrity of roofing would be disturbed if samples were taken. The second asbestos survey, however, did include these asbestos uses (see Section IV C4, below).
- (8) Asbestos insulation materials inside of motors, active boilers, or other active equipment. The second asbestos survey, however, did include these asbestos uses (see Section IV C4, below).
- (9) Asbestos in concrete parking curbs or other preformed concrete items.

While these potential sources of asbestos were not investigated in the original field survey of buildings/structures, the field team reported any suspicions of their existence to the JPL/GDSCC management staff.

#### 4. Asbestos Uses Included in the Survey of Roofs and Boilers.

The second field survey at the GDSCC, in September 1987, however, did include the uses of asbestos in roofing and boiler-insulation materials in 12 selected buildings at the GDSCC.

#### D. ORGANIZATION OF THIS REPORT

The remainder of this report is organized into seven sections. Section V provides a summary and conclusion of findings of the two GDSCC asbestos surveys. Section VI provides an inventory compilation of field data for each building and structure that was surveyed and was found to contain asbestos material(s). Drawings of buildings, which show sample locations and the location of materials that were positively identified as containing asbestos, have been incorporated into this report. Section VII deals with an Asbestos Abatement Plan that can be adapted for use at the GDSCC. Section VIII is an Asbestos Management Plan that can serve as the basis for the GDSCC asbestos management plan. Section IX outlines a future plan for the abatement of friable asbestos at the GDSCC. Section X is a bibliography of source and reference materials dealing with the asbestos problem, while Section XI is a certification of the work involved in the asbestos survey. The report concludes with eleven Appendixes that provide further details about the two asbestos surveys at the GDSCC.

## SECTION V

### SUMMARY AND CONCLUSIONS OF THE ASBESTOS SURVEY AT THE GDSCC

#### A. GENERAL FINDINGS

##### 1. Occurrences and Uses of Asbestos in Buildings/Structures at the GDSCC

Of the more than 93 buildings and structures at the GDSCC, 91 were surveyed for asbestos. Locations not surveyed include the following:

- (1) Those buildings and structures at Pioneer Station that are no longer managed by JPL/GDSCC were not surveyed and are not included in the list of 91 surveyed buildings. Buildings/structures G-6, G-7, and G-12 at Pioneer Station are still under JPL/GDSCC management, and these were surveyed.

Table 4 presents a listing of the 91 buildings and structures considered for survey at the GDSCC. In this section of the report, buildings and structures, will be referred to collectively as "buildings." The table identifies whether the building listed was not surveyed, whether it was surveyed and sampled for asbestos (asbestos present, no asbestos present), or whether it was surveyed but not sampled for asbestos (inspection only).

Of the buildings surveyed, asbestos was positively identified at 38 buildings. This represents approximately 41% of all buildings at the GDSCC. The 38 facilities have 49 uses of asbestos in pipe lagging, exterior siding, roofing, interior walls, floors, ceilings, heating vessels, and/or miscellaneous materials. This value does not take into account the discrete occurrences of asbestos (e.g., each pipe run that is wrapped in asbestos in a building), but indicates that a building has several uses of asbestos (e.g., asbestos in pipes, walls, and roofing). The total number of occurrences of asbestos was found to be 103, based on 288 unique samples collected and tested. Survey sample results are provided in Appendix B.

The distribution of uses of asbestos at GDSCC are:

- (1) Twelve buildings have asbestos-wrapped pipes.
- (2) One building has exterior siding containing asbestos.
- (3) Three buildings have roofing materials containing asbestos.
- (4) Four buildings have interior walls containing asbestos.
- (5) Twenty-eight buildings have flooring containing asbestos.
- (6) One building has asbestos-wrapped heating vessels.
- (7) No asbestos was discovered at the Pioneer Site.
- (8) Sixteen of twenty-six buildings surveyed at the Echo Site contain asbestos.

- (9) Five of fourteen buildings surveyed at the Venus Site contain asbestos.
- (10) Two of three buildings surveyed at the airport contain asbestos.
- (11) The single and only building at the Microwave Test Facility was surveyed and shown to contain asbestos.
- (12) Two of fourteen buildings surveyed at the Mars Site contain asbestos.
- (13) Nine of twenty-three buildings at the Apollo Site contain asbestos.
- (14) One of five buildings at the Mojave Base Site contains asbestos.
- (15) One of three miscellaneous locations (G-92 Pump House, G-93 Main Gate House, and G-100 Radio Spectrum Monitor) contains asbestos.
- (16) The single and only building at the Barstow office facility contains asbestos.

2. Occurrences of Asbestos-Containing Materials in Roofs and Boilers at Specified Buildings at the GDSCC

Asbestos was found at five of the twelve buildings at GDSCC that were surveyed for asbestos-containing materials in roofs and boilers. Table 5 presents the results of tests for asbestos-containing materials in roofs and boilers at specified buildings at the GDSCC. A report of laboratory analyses is included in Appendix B.

Of the 12 buildings surveyed, 11 were surveyed for roofing and 10 were surveyed for boilers. Asbestos was positively identified at five (42%) of the 12 buildings (G-26, G-38, G-72, G-81, and G-86). Five of the 11 buildings surveyed for roofs (45%) contained asbestos (G-26, G-38, G-72, G-81, and G-86). Three of the 10 buildings surveyed for boilers (30%) contained asbestos (G-26, G-38, and G-72).

Table 4. Summary of Findings of Buildings Surveyed for Asbestos-Containing Materials at the GDSCC<sup>a</sup>

Site	Bldg. No.	Building Name	Survey Findings <sup>b</sup>	
Pioneer	G-6	Collimation Tower	0	
	G-7	Collimation Bldg.	0	
	G-12	ACU Radio Repeater	0	
Echo	G-21	Admin/Engr/Cafeteria	Pos.	A,G
	G-22	Fire Line Pump House	Pos.	A
	G-23	Dormitory	Pos.	A,F,G
	G-24	Power Plant/Generator	Pos.	G
	G-25	Transportation/Maintenance	Pos.	G
	G-26	Operations Control	Pos.	A,G
	G-27	Storage	Pos.	A
	G-28	Machine Shop	Neg.	
	G-29	Storage	Neg.	
	G-30	Storage	0	
	G-33	Engineering/Communications	Pos.	A,G
	G-34	Hydro-Mechanical Bldg.	Neg.	
	G-35	34 M Antenna	0	
	G-36	Collimation Building	Pos.	G
	G-37	Seismic Laboratory	Pos.	G
	G-38	Facility Services	Pos.	A,G
	G-39	Paint Shop	0	
	G-40	Flammable Storage	0	
	G-41	Supply Warehouse	Neg.	
	G-42	Garage	Pos.	G
	G-43	Storage	Neg.	
	G-44	Drum Storage	Pos.	C
	G-45	Storage	Pos.	G
	G-46	Antenna Repair Shop	Pos.	A <sup>c</sup>
	G-47	Carpenter Shop	Pos.	G
	G-48	Collimation Tower	0	

<sup>a</sup>Buildings are listed in the order presented in the Directory of Goldstone Buildings and Facilities.

<sup>b</sup>0 = No suspect material observed; samples were not taken.

Neg.= laboratory analysis was negative for asbestos.

Pos.= laboratory analysis was positive for asbestos.

A = Asbestos found in pipe exterior insulation.

B = Asbestos found in roofing materials.

C = Asbestos found in wallboard.

D = Asbestos found in plenum areas.

E = Asbestos found in ceiling materials.

F = Asbestos found in steam vessel/boiler insulation.

G = Asbestos found in floor tile.

H = Asbestos found in miscellaneous uses.

<sup>c</sup>Pipe lying on ground, outside of Bldg. G-46, SE corner.

Table 4. (Cont'd)

Site	Bldg. No.	Building Name	Survey Findings <sup>b</sup>	
Venus	G-51	Operations Control	Pos.	A,C,G
	G-52	26 M Antenna	Neg.	
	G-53A	Transmitter	Pos.	G
	G-53B	26 M Hydro-Mechanical	0	
	G-54	Collimation Tower	0	
	G-55	9 M Antenna	Pos.	H <sup>d</sup>
	G-56	Security Bldg.	Pos.	G
	G-57	Collimation Bldg.	0	
	G-58	9 M Hydro-Mechanical/ Transmitter	Pos.	A
	G-60	Laboratory/ Office	Neg.	
	G-61	100 KW Transmitter	0	
	G-62	Fire Line Pump House	0	
	G-63	Workshop/Warehouse	Neg.	
	G-67	Distilled Water	0	
Airport	G-69	Airport Shelter	0	
	G-70	Battery/Portable Generator	Pos.	B
	G-71	Airport Facility	Pos.	G
Microwave Test Facility	G-72	Microwave Test Facility	Pos.	A,G
Mars	G-80	64 M Antenna	Pos.	G
	G-81	Power Plant/Generator	Neg.	
	G-82	Fire Line Pump/ Cooling Equipment	0	
	G-83	Cooling Tower	0	
	G-84	Training/ Office	Neg.	
	G-85	Flammable Storage	0	
	G-86	Operations Control	Pos.	A,G
	G-87	Security	Neg.	
	G-88	Transformer Rectifier	0	
	G-89	Reverse Osmosis Equipment	0	
	G-90	Storage	0	
	G-91	Switchgear	Neg.	
	G-94	Fire Line Pump House	0	
	G-95	34 M Antenna	0	
Misc.	G-92	Pump House	0	
	G-93	Main Gate House	Pos.	G
	G-100	GDSCC Radio Spectrum Monitor	0	

<sup>d</sup>Equipment box wrapped in asbestos-containing fabric.



Table 4. (Cont'd)

Site	Bldg. No.	Building Name	Survey Findings <sup>b</sup>	
Barstow		Barstow Office Building	Pos.	G
Apollo	A-1	Operations	Pos.	G
	A-2	Administration	Pos.	G
	A-3	26 M Hydro-Mechanical	0	
	A-4	26 M Collimation Tower Equipment Bldg.	Neg.	
	A-5	Hydrorepair Bldg.	Pos.	H <sup>e</sup>
	A-6	Microwave Terminal <sup>f</sup>		
	A-7	9 M Equipment House	Pos.	C
	A-8	9 M Collimation Tower	Pos.	B
	A-12	Apollo Fire Pump House	Neg.	
	A-14	Logistics Storage	0	
	A-85	26 M Antenna	Neg.	
	A-86	Collimation Tower	0	
	A-87	9 M Antenna	Neg.	
	A-88	Collimation Tower	0	
	M-1	Minitrack	Pos.	G
	M-2	Logistics	Pos.	G
	M-3	Utility	0	
	M-4	Camera Shelter	0	
	M-6	Telemetry	Pos.	A,B,G
	M-7	Transmitter	0	
	M-9	Power Plant/Generator	Pos.	G
	M-10	Flammable Storage	0	
	M-17	Mojave Fire Pump House	Neg.	
Mojave	M-5	12 M Collimation Tower <sup>f</sup>		
	M-8	Operations Building	Pos.	G
	M-12	CDP Depot Maintenance Bldg.	0	
	M-13	Equipment Building	0	
	M-50	12 M Antenna/Antenna Bldg.	0	

<sup>e</sup>Asbestos blanket and gloves lying on shelf inside building.

<sup>f</sup>Not surveyed.

Table 5. Results of Tests for Asbestos-Containing Materials in Roofs and Boilers at Specified Buildings at the GDSCC<sup>a</sup>

Site	Bldg. No.	Building Name	Material Surveyed	Test Result <sup>b</sup>
Echo	G-21	Admin/Engr/Cafeteria	Boiler	Neg.
	G-23	Dormitory	Boiler	Neg.
			Roof	Neg.
	G-26	Operations Control	Boiler	Pos.
			Roof	Pos.
	G-33	Engineering/Communications	Boiler	Neg.
			Roof	Neg.
Venus	G-38	Facility Services	Boiler	Pos.
			Roof	Pos.
	G-51	Operations Control	Boiler	Neg.
	G-53B	26 M Hydro-Mechanical	Roof	Neg.
	G-58	9 M Hydro-Mechanical/ Transmitter	Roof	Neg.
	G-60	Laboratory/Office	Roof	Neg.
Microwave Test Facility	G-72	Microwave Test Facility	Boiler	Pos.
			Roof	Pos.
Mars	G-81	Power Plant/Generator	Roof	Pos. <sup>c</sup>
	G-86	Operations Control	Boiler	Neg. <sup>d</sup>
			Roof	Pos. <sup>d</sup>

<sup>a</sup>Buildings are listed in the order presented in the Directory of Goldstone Buildings and Facilities.

<sup>b</sup>Neg. = laboratory analysis was negative for asbestos.

Pos. = laboratory analysis was positive for asbestos.

<sup>c</sup>The positive portion of the roof is the higher roof only at the west end of the building.

<sup>d</sup>The Building G-86 boiler was inspected and not sampled. The boiler is a Model I-1 Precision Parts Corporation electric boiler that was installed in 1979. All materials located in the boiler were fiberglass. The positive portion of the roof is the higher roof only at the east end of the building.

### 3. Incidental Uses of Asbestos-Containing Material at the GDSCC

The majority of asbestos-containing material identified at the GDSCC is used for insulation (pipe insulation, boiler jacketing), or construction materials (siding, floor tiles, roofing felts, and paneling). Very small amounts of asbestos-containing materials, however, may be contained in equipment, motors, appliances such as heating elements, valve gland packings, stove linings, gaskets, etc. (see Table 2 for additional examples of asbestos use in commerce). These uses of asbestos-containing materials do not normally pose a significant existing hazard to workers because the asbestos content is non-friable, generally enclosed, and of small quantity. Some of these uses of asbestos may be present at the GDSCC. For this reason, it is recommended, that the following precautions be taken:

- (1) The GDSCC Purchasing Department should stipulate to future suppliers that no items should contain asbestos materials. Substitute materials generally are available.
- (2) Maintenance personnel should be made aware of the possibility of asbestos materials being present in certain items (valve packings and gasket material), and in specified areas at the GDSCC. Personnel should be properly trained to work with asbestos-bearing materials, and should be required to follow established written procedures for handling and disposing of these items during maintenance and replacement activities.

The MBGA survey team collected samples of several items identified above as miscellaneous or incidental uses. Samples of gasket material, fireproof blankets and gloves, underground telephone conduit, underground water pipe, and woven cloth found in the air conditioning system were collected for analysis. Test results for these materials were positive for asbestos and have been included in the asbestos inventory in Section VI.

Analysis of several samples of engine gasket materials reveals that some of the older gasket material used at the GDSCC does contain asbestos. Both prefabricated gaskets and gasket sheeting for hand-cut gaskets were found to contain asbestos. The prefabricated gaskets are considered non-friable and are considered to pose no significant health hazard unless they are modified in such a manner as to generate dust (cutting, sanding, filing). The gasket sheeting, which is cut to form custom gaskets, is handled in a manner that can produce asbestos dust.

It is recommended that use of this gasket-sheeting material be discontinued, and a suitable replacement be found. If an asbestos-containing gasket must be used, it should be handled following established written procedures that include specifications for personnel protection. The asbestos cuttings or scrap material should be disposed of in a Class I or designated Class II landfill. The Echo Site landfill is a Class III facility. As such, it is not approved for disposal of asbestos.

#### 4. Quantities of Asbestos in Buildings and Structures at the GDSCC

There is an estimated 83,583 square feet (SF) of asbestos in buildings and structures at the GDSCC. This includes all asbestos identified during the survey, except asbestos in pipe wrapping. The quantity of asbestos in pipe wrapping, generally expressed in linear feet (LF) rather than square feet, is estimated to be 645 LF.

The quantity of asbestos-containing material known to exist at the GDSCC, reported in units of linear or square feet for each use of asbestos, is listed in Table 6. The table shows an estimated 74,696 SF of asbestos-containing material is found in flooring materials. This represents about 89 percent of all asbestos identified during the survey and is the largest single use of asbestos at the GDSCC.

Estimated quantities of each use of asbestos found in or adjacent to buildings at the GDSCC and the percentage of that use at the GDSCC is summarized below:

- (1) Twelve buildings/structures contain 645 LF of friable asbestos-insulated pipe.
- (2) One building contains 812 SF (less than 1%) of non-friable exterior siding that contains asbestos.
- (3) Three buildings contain 5,217 SF (6%) of non-friable roofing containing asbestos.
- (4) Four buildings contain 2,816 SF (3%) of non-friable asbestos in interior transite walls and partitions.
- (5) Asbestos was not discovered in ceiling tiles or other ceiling materials.
- (6) Twenty-eight buildings contained 74,696 SF (89%) of non-friable asbestos floor tiles.
- (7) One building contains 42 SF (less than 1%) of asbestos boiler jacketing.

#### 5. Estimated Quantities of Asbestos-Containing Materials Found in Roofing Materials and Boiler Insulation at the GDSCC.

There is an estimated 30,228 square feet (SF) of asbestos-containing material in Buildings G-26, G-38, G-72, G-81, and G-86. Of this square-footage, only 4.03 SF is estimated to occur in boiler insulating material and 30,224 SF is estimated to occur in roofing material. Quantities of asbestos-containing material found in each of the above-listed buildings is shown in Table 7.

Table 6. Asbestos-Containing Materials Found at the GDSCC

Building No.	Pipes (LF)	Siding (SF)	Roofing (SF)	Walls (SF)	Ceilings (SF)	Floors (SF)	Vessels (SF)
G-21	37	0	0	0	0	7,700	0
G-22	1	0	0	0	0	0	0
G-23	54	0	0	0	0	2,443	42
G-24	0	0	0	0	0	1,294	0
G-25	0	0	0	0	0	240	0
G-26	32	0	0	672	0	1,831	0
G-27	1	0	0	0	0	0	0
G-33	237	0	0	0	0	3,310	0
G-36	0	0	0	0	0	289	0
G-37	0	0	0	0	0	492	0
G-38	59	0	0	0	0	5,849	0
G-42	0	0	0	0	0	577	0
G-44	0	812	0	0	0	0	0
G-45	0	0	0	0	0	111	0
G-47	0	0	0	0	0	1,247	0
G-53A	0	0	0	0	0	676	0
G-56	0	0	0	0	0	100	0
G-58	1	0	0	0	0	0	0
G-70	0	0	360	0	0	0	0
G-71	0	0	0	0	0	360	0
G-72	32	0	0	0	0	2,391	0
G-80	0	0	0	0	0	3,000	0
G-86	98	0	0	768	0	7,150	0
G-93	0	0	0	0	0	270	0
Barstow	0	0	0	0	0	23,212	0
A-1	0	0	0	0	0	4,116	0
A-2	0	0	0	0	0	3,400	0
A-7	0	0	0	256	0	0	0
A-8	0	0	128	0	0	0	0
M-1	0	0	0	0	0	16	0
M-2	0	0	0	0	0	840	0
M-6	25	0	4,729	0	0	778	0
M-9	0	0	0	0	0	160	0
M-8	0	0	0	0	0	1,344	0
Subtotals	645	812	5,217	2,816	0	74,696	42
Total SF of all asbestos uses at the GDSCC, except pipe wrap						83,583 SF	

Table 7. Quantities of Asbestos-containing Materials found in Roofing and Boilers at Specified Buildings Surveyed at the GDSCC

Site	Building Number	Roofing (SF)	Boilers (SF)
Echo	G-26	11,508	1.29
Echo	G-38	9,396	1.29
MTF	G-72	2,880	1.45
Mars	G-81	5,000	0.00
Mars	G-86	1,440	0.00
Subtotal SF		30,224	4.03
Estimated Total SF of Roofs and Boilers		30,228 SF	

SF means square feet.

## 6. Asbestos-Sampling Programs

The asbestos sampling programs were designed to collect samples of suspected asbestos material from locations that could be sampled by the survey team without causing damage to property or without creating undue risk to the health and safety of both the survey team and GDSCC personnel. Generally, GDSCC management was consulted when decisions had to be made regarding these issues.

One sampling problem arose while collecting samples of roofing material. There are three types of roofing finishes used at the GDSCC: corrugated metal roofing; fiberglass-reinforced roof coating with reflective surfacing; and mineral-surfaced cap sheet (pebble and tar) assumed to be underlain by felt or fiberglass ply sheets.

The corrugated roofing was metal only and was not sampled. Using a hand auger for boring, the fiberglass-reinforced roofing could not be penetrated to obtain samples of underlying felt or ply sheets. No samples of underlying materials, therefore, were obtained. A small piece of resinous material that was collected tested negative for asbestos. It should be noted that felts or ply sheets typically are laid under fiberglass coatings and that fiberglass finishes often are applied over old mineral-surfaced roofing materials. Thus when these non-sampled roofs are to be replaced, the GDSCC should take a conservative view and assume the possibility of asbestos being present in this type of roofing. These roofing materials should be sampled for asbestos prior to their removal and disposal.

Eleven samples of mineral-surfaced roofing were collected and tested for asbestos content. Of these, three samples tested positive for asbestos. Several roofs were not sampled because the thickness of the tar layer on these roofs was too great to allow a sample to be obtained by boring with a hand auger. Again, it is recommended that the GDSCC assume that asbestos is present in the mineral-surfaced roofs that were not sampled. Thus, when these roofs are to be replaced, they should be sampled for asbestos content prior to their removal and disposal.

In the second field survey, however, conducted in September 1987, roofs and boiler-insulation materials of 12 selected buildings at the GDSCC subsequently were sampled for asbestos through the use of power tools for boring. The holes that were left in the roof, following removal of the bored-out samples, were then plugged up by GDSCC personnel.

### B. CONDITION OF ASBESTOS IN BUILDINGS AND STRUCTURES AT THE GDSCC

The condition of asbestos in buildings/structures at the GDSCC was found to be either 1) undisturbed, 2) having some water damage, 3) having some physical damage, or 4) having some evidence of delamination.

All of the sampled roofs that contained asbestos were found to have some physical damage. All of the sampled boiler insulation that contained asbestos was found to be in an undisturbed condition.

A summary of the condition of asbestos found in buildings/structures at the GDSCC and recommendations for abatement timing and methods are provided in Table 8. Similarly, a summary of the condition of asbestos found in roofs and

boilers at the GDSCC and recommendations for abatement timing and methods are provided in Table 9.

The following summary of data taken from Table 8 provides a profile of conditions identified in the 34 asbestos-containing buildings and structures listed in Table 6:

- (1) Forty-one of 109 occurrences of asbestos found at the GDSCC are in an undisturbed condition.
- (2) Sixty-one of 109 occurrences of asbestos found at the GDSCC have some physical damage.
- (3) One of 109 occurrences of asbestos found at the GDSCC had some water damage.
- (4) Two of 109 occurrences of asbestos found at the GDSCC have some delamination evident.
- (5) Thirty-eight of 49 pipe wraps sampled have some physical damage and one pipe wrap has evidence of delamination. These conditions occur in nine buildings. Ten of the 49 pipe wraps are undisturbed.

A review of the data of Table 8 shows occurrences of asbestos at the GDSCC to warrant near-future abatement action. Buildings G-21, G-22, G-23, G-26, G-27, G-33, G-38, G-51, G-58, G-72, G-86, and M-6 are identified as requiring abatement in the near future. The remainder of the buildings do not at this time require abatement prior to demolition, repair, or damage, since they contain non-friable materials with little or no physical damage.

#### C. RATIONALE FOR SUGGESTED TIMING OF ASBESTOS ABATEMENT

In Section VI of this report, recommendations are made for timing abatement actions for each occurrence of asbestos at the GDSCC. Three categories of abatement timing are considered:

- (1) IMMEDIATE: This implies actual or imminent hazard to personnel and some rapid remedial measures are required.
- (2) NEAR FUTURE: This category covers most of the friable asbestos pipe and vessel wrapping at the GDSCC. It applies primarily to any friable insulation that is in a high population area or for any friable material that is extensively damaged. It implies that a decision should be made as to whether the asbestos-containing material should be totally removed or only damaged areas repaired and undisturbed material left in place. The NEAR FUTURE category implies a need to make decisions in the near future. If friable asbestos is not removed, a periodic routine surveillance program must be established.
- (3) AT THE TIME OF DEMOLITION, REPAIR, OR DAMAGE: This category covers those conditions where no apparent hazard to personnel can be envisioned, unless material is damaged or being worked on in a manner to cause dust to be generated (e.g., sawing, drilling, etc.).



Table 8. Condition of Asbestos at the GDSCC and Recommended Abatement Timing

Bldg. No. <sup>a</sup>	Ref. No. <sup>b</sup>	Condition of Asbestos Material	Recommended Abatement Timing	Recommended Removal Method
G-21	AA	Some physical damage	Near future	Removal
G-21	AC	Some physical damage	Near future	Removal
G-21	AD	Some physical damage	Near future	Removal
G-21	AE	Some physical damage	Near future	Removal
G-21	AG	Some physical damage	Near future	Removal
G-22	AA	Some physical damage	Near future	Removal
G-23	AD	Some physical damage	Near future	Removal
G-23	AF	Some physical damage	Near future	Removal
G-23	AI	Some physical damage	Near future	Removal
G-23	AK	Some physical damage	Near future	Removal
G-23	AM	Some physical damage	Near future	Removal
G-26	AA	Some physical damage	Near future	Removal
G-26	AC	Some physical damage	Near future	Removal
G-26	AE	Some physical damage	Near future	Removal
G-26	AG	Some physical damage	Near future	Removal
G-26	AJ	Some physical damage	Near future	Removal
G-26	AL	Some physical damage	Near future	Removal
G-27	AA	Some physical damage	Near future	Removal

<sup>a</sup>List of buildings in which asbestos positively was identified.

<sup>b</sup>The first letter in a reference number refers to a specific use of asbestos. The second letter refers to the number of occurrences of the specified use in a given building. For example: Bldg. No. G-33 and Ref. No. AD means the fourth pipe in Building G-33 that was found to be wrapped in an asbestos-containing material, since A stands for pipe wrap and D is the fourth letter in the alphabet. The key for asbestos use follows:

A = asbestos found in pipe wrap insulation.

B = asbestos found in exterior siding or roofing materials.

C = asbestos found in wall structures or partitions.

F = asbestos found in steam vessel or boiler wrap insulation.

G = asbestos found in floor tile.

H = miscellaneous uses of asbestos.

Table 8. (Cont'd)

Bldg. No.	Ref. No.	Condition of Asbestos Material	Recommended Abatement Timing	Recommended Removal Method
G-33	AC	Some physical damage	Near future	Removal
G-33	AD	Some physical damage	Near future	Removal
G-33	AG	Some physical damage	Near future	Removal
G-33	AK	Some physical damage	Near future	Removal
G-33	AL	Some physical damage	Near future	Removal
G-33	AN	Some physical damage	Near future	Removal
G-33	AP	Some physical damage	Near future	Removal
G-33	AR	Some physical damage	Near future	Removal
G-33	AT	Some physical damage	Near future	Removal
G-38	AB	Some physical damage	Near future	Removal
G-38	AF	Some physical damage	Near future	Removal
G-38	AG	Some physical damage	Near future	Removal
G-38	AH	Some physical damage	Near future	Removal
G-38	AI	Some physical damage	Near future	Removal
G-38	AJ	Some physical damage	Near future	Removal
G-86	AA	Some physical damage	Near future	Removal
G-86	AB	Some physical damage	Near future	Removal
G-86	AC	Some physical damage	Near future	Removal
G-86	AD	Some physical damage	Near future	Removal
G-51	AD	Some delamination evident	Near future	Removal
G-23	FA	Undisturbed	Near future	Removal
G-51	AB	Undisturbed	Near future	Removal
G-51	AE	Undisturbed	Near future	Removal
G-51	AF	Undisturbed	Near future	Removal
G-58	AA	Undisturbed	Near future	Removal
G-72	AB	Undisturbed	Near future	Removal
G-72	AE	Undisturbed	Near future	Removal
G-72	AF	Undisturbed	Near future	Removal
G-72	AH	Undisturbed	Near future	Removal

Table 8. (Cont'd)

Bldg. No.	Ref. No.	Condition of Asbestos Material	Recommended Abatement Timing	Recommended Removal Method
G-72	AJ	Undisturbed	Near future	Removal
M-6	AA	Undisturbed	Near future	Removal
G-21	GC	Some physical damage	Time of demolition	Removal
G-33	GB	Some physical damage	Time of demolition	Removal
G-44	CA	Some physical damage	Time of demolition	Removal
G-47	GA	Some physical damage	Time of demolition	Removal
G-51	CA	Some physical damage	Time of demolition	Removal
G-56	GA	Some physical damage	Time of demolition	Removal
G-71	GA	Some physical damage	Time of demolition	Removal
G-72	GA	Some physical damage	Time of demolition	Removal
G-72	GB	Some physical damage	Time of demolition	Removal
G-72	GC	Some physical damage	Time of demolition	Removal
G-72	GD	Some physical damage	Time of demolition	Removal
G-80	GA	Some physical damage	Time of demolition	Removal
G-80	GC	Some physical damage	Time of demolition	Removal
G-80	GD	Some physical damage	Time of demolition	Removal
G-86	GA	Some physical damage	Time of demolition	Removal
A-2	GB	Some physical damage	Time of demolition	Removal
A-2	GC	Some physical damage	Time of demolition	Removal
M-2	GA	Some physical damage	Time of demolition	Removal
M-2	GB	Some physical damage	Time of demolition	Removal
M-6	BA	Some physical damage	Time of demolition	Removal
M-9	GA	Some physical damage	Time of demolition	Removal
A-2	GA	Some delamination evident	Time of demolition	Removal
G-33	GC	Some physical damage	Time of demolition	Removal
G-36	GA	Some physical damage	Time of demolition	Removal
G-38	GB	Some physical damage	Time of demolition	Removal
G-37	GA	Some water damage	Time of demolition	Removal
G-21	GA	Undisturbed	Time of demolition	Removal
G-21	GB	Undisturbed	Time of demolition	Removal

Table 8. (Cont'd)

Bldg. No.	Ref. No.	Condition of Asbestos Material	Recommended Abatement Timing	Recommended Removal Method
G-23	GA	Undisturbed	Time of demolition	Removal
G-24	GA	Undisturbed	Time of demolition	Removal
G-24	GB	Undisturbed	Time of demolition	Removal
G-25	GD	Undisturbed	Time of demolition	Removal
G-26	CA	Undisturbed	Time of demolition	Removal
G-26	GB	Undisturbed	Time of demolition	Removal
G-26	GC	Undisturbed	Time of demolition	Removal
G-26	GD	Undisturbed	Time of Demolition	Removal
G-33	GA	Undisturbed	Time of demolition	Removal
G-33	GD	Undisturbed	Time of demolition	Removal
G-42	GA	Undisturbed	Time of demolition	Removal
G-42	GB	Undisturbed	Time of demolition	Removal
G-42	GC	Undisturbed	Time of demolition	Removal
G-45	GA	Undisturbed	Time of demolition	Removal
G-51	GA	Undisturbed	Time of demolition	Removal
G-53A	GA	Undisturbed	Time of demolition	Removal
G-70	BA	Undisturbed	Time of demolition	Removal
G-86	CA	Undisturbed	Time of demolition	Removal
G-93	GC	Undisturbed	Time of demolition	Removal
Barstow	GA	Undisturbed	Time of demolition	Removal
Barstow	GB	Undisturbed	Time of demolition	Removal
A-1	GA	Undisturbed	Time of demolition	Removal
A-7	CA	Undisturbed	Time of demolition	Removal
A-8	BA	Undisturbed	Time of demolition	Removal
M-1	GB	Undisturbed	Time of demolition	Removal
M-1	GC	Undisturbed	Time of demolition	Removal
M-6	GA	Undisturbed	Time of demolition	Removal
M-8	GB	Undisturbed	Time of demolition	Removal

Table 9. Condition of Asbestos in Roofs and Boilers at Specified Buildings at the GDSCC and Recommended Abatement Timing

Bldg. No. <sup>a</sup>	Sample Number <sup>b</sup>	Use	Condition of Asbestos Material	Recommended Abatement Timing	Recommended Removal Method
G-26	31	Boiler	Undisturbed	Time of replacement, repair, or demolition	Removal
G-26	15	Roof	Some physical damage	Time of replacement, repair, or demolition	Removal
	16	Roof			
	18	Roof			
G-38	25	Boiler	Undisturbed	Time of replacement, repair, or demolition	Removal
G-38	11	Roof	Some physical damage	Time of replacement, repair, or demolition	Removal
G-72	43	Boiler	Undisturbed	Time of replacement, repair, or demolition	Removal
G-72	20	Roof	Some physical damage	Time of replacement, repair, or demolition	Removal
G-81	22	Roof	Some physical damage	Time of replacement, repair, or demolition	Removal
G-86	23	Roof	Some physical damage	Time of replacement, repair, or demolition	Removal

<sup>a</sup> List of only those buildings in which asbestos in roofs or boilers was positively identified.

<sup>b</sup> Last two digits of sample number (See Appendix B).

As can be seen in Table 8, all friable asbestos-containing insulation in buildings/structure, except undamaged metal-wrapped insulation, falls into the NEAR-FUTURE timing category. This is a conservative approach. The rationale for recommending NEAR-FUTURE removal of pipe and boiler insulation in good, undisturbed condition is based on the high probability for future asbestos release should the insulation be damaged. There are alternatives to removal such as enclosure (the installation of metal lagging over asbestos wrapping). This involves a cost in the asbestos abatement program, however, that does not alleviate the potential for future exposures to asbestos.

All friable asbestos-containing boiler insulation identified during the survey is undamaged and metal-wrapped. Thus, the suggested timing of asbestos abatement for boiler insulation is AT THE TIME OF DEMOLITION, REPAIR, OR DAMAGE. The criteria used in determining abatement timing are found in Table E-1 (Appendix E) of this report.

The only other feasible alternative to removal is to periodically monitor the condition of all friable insulation on pipes and boilers for as long as the asbestos remains in place. At the time of building or structure demolition, asbestos-containing materials will have to be removed separately anyway. The rationale to be applied in determining proper abatement timing is found in Appendix E of this report.

Two recommendations for abatement action are considered sufficient to cover all combinations of conditions identified. These recommendations are for removal in the near future and removal at the time of demolition or extensive damage. Although NASA guidance does not recommend removal of asbestos simply because of its presence, all friable asbestos materials found in pipe and boiler wrap at the GDSCC will be removed. This is to protect the health of maintenance personnel who may be exposed to friable asbestos fibers during repair or restructuring work on pipes and boilers.

All other asbestos-containing materials found at the GDSCC are non-friable, and do not require abatement unless these materials are severely disturbed or damaged. For non-friable asbestos-containing materials, therefore, abatement is recommended at the time of damage or building demolition.

## SECTION VI

### INVENTORY OF ASBESTOS OCCURRENCES AT THE GDSCC

#### A. INTRODUCTION

From October 1986 through November 1986, a field survey was conducted at the Goldstone Deep Space Communications Complex (GDSCC) and at the GDSCC contractor offices in Barstow to identify and quantify asbestos in buildings and structures. A second field survey, including the roofs and boilers of 12 specified buildings at the GDSCC, was conducted in September 1987. Because they were built or installed before the ban on the use of asbestos in construction materials, the facilities at the GDSCC have many older buildings/structures that could contain asbestos-bearing materials. To eliminate the potential for exposure of its personnel to asbestos, the JPL/GDSCC contracted with M.B. Gilbert Associates (MBGA), Long Beach, California, to conduct a survey to locate asbestos-containing materials at both GDSCC buildings/structures, in general, and at the roofs and boilers of 12 selected buildings, in particular. Both field surveys were to determine the quantity, type, and condition of these asbestos-containing materials. The resultant information base, once compiled into a usable format, then could be used by the appropriate JPL/GDSCC personnel to make informed decisions on the scheduling and budgeting of asbestos abatement projects.

#### B. FIELD METHODOLOGY

##### 1. Selection of Buildings and Structures to be Surveyed

The buildings to be surveyed included all buildings described in the Directory of Goldstone Buildings and Facilities, December 1985 edition, (Gold Book), with the following exceptions:

- (1) The Pioneer Site buildings and structures (military has assumed responsibility).

##### 2. Selection of Roofs and Boilers of Specific Buildings to be Surveyed

The 12 buildings surveyed were selected by the GDSCC Environmental Coordinator and included Buildings G-21, G-23, G-26, G-33, G-38, G-51, G-53B, G-60, G-72 and G-86.

##### 3. Asbestos Uses Included in the Survey

The uses of asbestos included in the first field survey were those applications in flooring and roofing (except as described below); interior and exterior walls, ceiling tile, and ceilings (including sprayed-on applications); interior and exterior pipes, ducts, boilers, and other insulated equipment (except as described below); asbestos materials in storage pending use or disposal; and miscellaneous uses of asbestos that were identified during the course of the survey.

It was established prior to initiation of the field survey that certain asbestos uses would not be addressed by the survey. These uses are listed below:

- (1) Asbestos used in underground piping.
- (2) Other underground occurrences of asbestos.
- (3) Asbestos used in gaskets, where equipment would have to be disassembled to collect a sample.
- (4) Valve gland packings, sealants, lubricants or similar materials used in equipment at the GDSCC.
- (5) Asbestos-wrapped piping and other concealed asbestos materials in walls, where wall materials would require removal or destruction to obtain samples.
- (6) Asbestos in flooring tiles, felts, or papers, where the integrity of the flooring would be disturbed if samples were taken.
- (7) Asbestos in roofing tiles, felts, or papers, where the integrity of the roofing would be disturbed if samples were taken.
- (8) Asbestos insulation materials inside of motors, active boilers, or other active equipment.
- (9) Asbestos in concrete parking curbs or other preformed concrete items.

While these potential sources of asbestos were not investigated, the field team reported any suspicions of their existence to the JPL/GDSCC management staff.

The second field survey, in September 1987, however, did include the uses of asbestos in roofing and boiler-insulation materials in 12 selected buildings at the GDSCC.

#### 4. Field Investigation and Sampling Protocols for Buildings/Structures

The buildings/structures field survey was conducted in October and November 1986 by a team of two qualified industrial hygienists and an engineer trained to work in asbestos environments. Team members were provided with Field Data Forms, Sample Log Forms, Photograph Log Forms, sampling and decontamination equipment, cameras, and personnel safety and protective equipment. Appendix C not only details the field protocol used by the survey team but also provides examples of field forms and logs.

Buildings and structures were surveyed both inside and outside for asbestos-containing materials. Samples were taken for analysis, unless the field investigators were absolutely certain that a material contained no asbestos. Sampling protocol is discussed in detail in Appendixes C and D.



Three hundred and twenty bulk samples were collected in the field. Ten percent (thirty-two samples) were replicates that were sent to the laboratory in support of the project's quality control program. The laboratory was unaware that any of the samples to be tested were replicates.

Samples were analyzed using the Polarized Light Microscopy Method (EPA Method 600/M4-82-020). Using this technique, a detection limit of 1% asbestos is possible. Laboratory reports indicated not only the percentage but also the type of asbestos present.

## 5. Field Investigation and Sampling Protocols for Roofs and Boilers

The second field survey was conducted in September 1987 by a team of two qualified field engineers, including an engineer trained to work in asbestos environments. Team members were provided with Standardized Field Forms listing data to be obtained in the field. The Standardized Form facilitates data entry into the computer and ensures that all pertinent data are collected. In addition, team members were provided with sampling and decontamination equipment, cameras, and personnel safety and protective equipment. Appendix C details the field protocol used by the survey team.

Samples of roofing materials were obtained using a power core drill. This use of a power core drill allowed for collection of roofing materials all the way down to the base roof, including collection of roofing felts that may have been applied below the exterior roofing material. Samples were taken for analysis, unless the field investigators were one hundred percent certain that a material was non-asbestos. Sampling protocol is discussed in detail in Appendix D.

Forty-six bulk samples were collected in the field. Replicate samples were taken to support the project's quality control program. The laboratory was unaware that any of the samples to be tested were replicates. Samples were analyzed by polarized light microscopy as described in Section VI B4 above.

## 6. Air Sampling and Analysis

Air sampling and analysis were not included in the scope of the survey, although the field survey team was instructed to report conditions encountered in the field that appeared to warrant immediate consideration for air sampling. This decision was to be based on the presence of any obvious condition that could lead to human exposure. Air sampling, however, will be essential prior to, during, and following removal/abatement operations.

The U.S. EPA does not recommend the use of air monitoring for assessment purposes at this time. The agency believes that the difficulty of sampling in occupied buildings, the number of samples needed to detect peak as well as prevalent airborne levels, and the cost for analysis, which can exceed \$500 per sample, are valid reasons to preclude the use of air monitoring for routine assessment purposes.

## 7. Compilation and Evaluation of Field Data

Large quantities of data were collected during the field survey. The principal steps taken in the organization and the evaluation of these data are as follows:

- (1) Field forms were customized to facilitate data entry into a standardized and computerized information management system. Once the field forms were reviewed for completeness and accuracy by the field team supervisor, the forms were submitted for computer processing. A program written in DBase III programming language was used to process field data. The data entered into the program were printed and proofed to identify and correct data entry errors. If data entry personnel required clarification of input data, the field investigators were queried and the questions were resolved.
- (2) Field sketches showing building configurations and general locations of asbestos-containing materials were used to prepare 8 1/2 x 11" finished drawings.
- (3) Asbestos sample results were obtained from the analytical laboratory, and data for locations that tested negative for asbestos were eliminated from the database.
- (4) A computer-generated narrative was prepared for each building and structure found to contain asbestos, describing asbestos location, type, quantity, condition, and other pertinent information. This inventory of asbestos occurrences at GDSCC is presented in this section (Section VI) of this report.
- (5) Computerized data on asbestos both in buildings and structures and in roofing and boiler insulation in 12 selected buildings were compiled into summary tables to facilitate data analysis. Summary tables were used to determine the distribution of asbestos in buildings/structures and in roofing and boiler insulation at the 12 selected buildings at the GDSCC, the distribution of conditions requiring abatement actions, and the priority for scheduling abatement actions. These summary tables are presented in Section V of this report.

## C. ORGANIZATION OF DATA

### 1. Presentation of Data

The results of the field survey are presented in Section VI D. The information provided is an inventory only of those buildings/structures and the selected roofs and boiler insulation at the GDSCC that were found to contain asbestos-bearing materials. The information presented is grouped by location (Echo Site, Venus Site, Airport) and, within each location, by building number in the same order used in the Directory of Goldstone Buildings

and Facilities, December 1985. Data for each building or structure are provided in two segments as follows:

- (1) Segment 1: General Building Information. This segment provides information on building location (map grid), construction date, building type, number of floors, total floor area, building use, and summary of types of asbestos used in the building.
- (2) Segment 2: Information on each occurrence of asbestos found in a building. This segment provides the following detailed information on each occurrence of asbestos in a building:
  - (a) Location of the asbestos-bearing material.
  - (b) Quantity of material present.
  - (c) Condition of material (presence of protective coatings).
  - (d) Building use.
  - (e) Work population.
  - (f) Type of ventilation.
  - (g) Accessibility to areas containing asbestos.
  - (h) Types of obstructions to the area containing asbestos.
  - (i) Types of activities in the building that could disturb the asbestos.
  - (j) Presence of sensitive equipment.
  - (k) Suggested asbestos abatement timing.
  - (l) Suggested abatement method.
  - (m) Assessment of the need for air monitoring.
  - (n) Comments on special conditions.

There is a single Segment 1 description for each building in the inventory. There are as many Segment 2 descriptions as there are different occurrences of asbestos in a building. An explanation of the terminology used above is provided below in Section VI C2.

## 2. Explanation of Terminology Used in Descriptions of Facilities

a. Friability of Material. This condition refers to whether or not asbestos fibers are tightly bound or subject to release.

b. Condition of Material. This information is useful in the determination of the degree and type of asbestos abatement needed. In those cases where some portions of asbestos material are damaged and other portions are undisturbed, the worse case (damaged) is used. Categories used in order of degree of disturbance are:

- (1) Undisturbed.
- (2) Some water damage.
- (3) Some physical damage.
- (4) Some delamination evident.
- (5) Extensive water damage.
- (6) Extensive physical damage.
- (7) Extensive delamination.

c. Types of Coatings Present. This information is useful in assessment of the likelihood of asbestos release to work areas under normal conditions, and in the determination of what factors should be considered in the design of an asbestos-abatement program. Categories used are:

- (1) None.
- (2) Coatings/encapsulants (paint, sprayed on sealants).
- (3) Metal covering (lagging).
- (4) Cloth covering (lagging).
- (5) Structural enclosure (pipes behind walls).

d. Building Use Near Asbestos. Under the General Building Information section, this refers to the designated building use (post office, clinic). Under the sections on descriptions of asbestos use, the variable responses refer to the routine use of each building at or near the location where asbestos-bearing materials are found.

e. Work Population. This is an estimate that refers to the number of individuals routinely assigned to or frequenting an asbestos-containing area. This information permits an assessment of the (1) number of potentially exposed individuals, and (2) the degree of imposition to work operations during an asbestos-removal project. Population ranges considered are:

- (1) None.
- (2) 1-10.

- (3) 11-50.
- (4) 51-100.
- (5) 101-500.
- (6) Greater than 500.

f. Ventilation. The reason for obtaining this information is to assess the extent of potential asbestos exposure, should there be a local release of asbestos materials. Categories used are:

- (1) Natural.
- (2) General forced air.
- (3) Local forced air.

g. Accessibility to Area. The objective of obtaining this information is to provide an asbestos-removal contractor with a basis for determining how difficult asbestos removal would be. This information can be used to adjust costs for asbestos removal. Categories used are:

- (1) Within normal reach.
- (2) 8-ft ladder (working height 8-ft or less from ground).
- (3) Greater than 8-ft ladder (working height greater than 8 ft above ground level).
- (4) Plenum or crawl space congested.
- (5) Isolated behind or under construction materials.
- (6) Small, tight spaces.
- (7) Covered trench or vault.

h. Obstructions to Area. This provides additional information to an asbestos-removal contractor when estimating the cost of asbestos removal. Categories used are:

- (1) None.
- (2) Permanent equipment/furnishings/structures.
- (3) Portable equipment/furnishings/structures.

i. Physical Disturbances. These are specific and local phenomena that could result in the deterioration or release of asbestos to the environment.

- (1) None.
- (2) Normal vibrations from fans, closing doors, noise, etc.
- (3) Physical abuse (scuffing, tearing, bruising, puncturing).

j. Presence of Sensitive Equipment. This provides the contractor with data related to protecting equipment that may be easily damaged during a tear-out operation.

k. Suggested Abatement Timing. This provides an indication of the degree of urgency for abatement action. Categories used are:

- (1) None required at this time.
- (2) At time of renovation, repair, or damage. (If asbestos-bearing material is disturbed at any time, then the damaged portion should be repaired or removed. The need for total removal should be re-assessed at that time).
- (3) In the near-future category (within 6 months) implies that a decision for action should not be prolonged. Generally it is applied to conditions that are prone to worsen.
- (4) Removal of asbestos.

l. Suggested Abatement Method. This provides an indication of the type of abatement that would minimize or eliminate potential risk of exposure to asbestos.

- (1) Removal.
- (2) Isolation (e.g., providing an enclosure such as metal lagging).
- (3) Encapsulation.
- (4) None. An exception is the replacement of damaged areas.

m. Suggested Airborne Monitoring. This provides an indication for the need and urgency for evaluating airborne asbestos exposures associated with a specific form and location of asbestos. Categories used are:

- (1) None required under normal conditions.
- (2) Initially, to determine potential exposures.
- (3) Initially, and annually thereafter.

3. Method Used to Refer to Occurrences of Asbestos in Buildings/Structures at the GDSCC

Each description in Segment 2 has a title, such as "PIPE LINES (Reference AA)," that describes the generalized use of the asbestos. The reference number, describing an occurrence, can be used in conjunction with the building number to locate that occurrence of asbestos on a drawing and to match it with a particular asbestos sample number.

The first letter of the reference number represents the type of asbestos use. The second letter represents the order in which the asbestos was sampled. Referring to the reference number key provided below, Reference AA is pipe wrap, and the first sample taken for analysis. Similarly, Reference GD is floor tile, the fourth sample taken for analysis (since G represents floor tile and D is the fourth letter of the alphabet). The reference key is presented below:

- (1) A = asbestos found in pipe wrap insulation.
- (2) B = asbestos found in exterior siding or roof material.
- (3) C = asbestos found in wall structures or partitions.
- (4) D = asbestos found in plenum, attic, or crawl-spaces.
- (5) E = asbestos found in ceilings or ceiling structures.
- (6) F = asbestos found in steam vessels.
- (7) G = asbestos found in flooring materials.
- (8) H = asbestos found in miscellaneous materials.

4. Method Used to Refer to Occurrences of Asbestos in Roofs and Boilers at the GDSCC

As with the Segment 2 descriptions for buildings/structures, each Segment 2 description for roofs and boilers has a title, such as "ROOFING MATERIAL" (Reference 22), that describes the generalized use of the asbestos. The reference number can be used in conjunction with the building number to locate that occurrence of asbestos on a drawing and to match it with a particular asbestos sample number. In contrast to the use of alphabet letters for reference numbers to describe the uses of asbestos in buildings/structures, Arabic numerals are used to describe the uses of asbestos in roofs and boilers. Thus, the reference number for roofs and boilers matches the last two digits of the sample number. Samples having the last two digits of 01 through 24 were obtained from roofing materials. Samples having the last two digits of 25 through 44 were obtained from boiler insulation.

## 5. Preparation of Drawings

Drawings showing the approximate locations of asbestos have been prepared from photographs of drawings taken from the Directory of Goldstone Buildings and Facilities, December 1985. Each building inventory is followed by a drawing. Drawings show the location of asbestos, keyed to a reference number (e.g., AB, GA, GB, 19, 22, 44). The reader, therefore, can match a Segment 2 description with the reference number on the drawing, and can match sample numbers and analytical results from the list provided in Table B-1 of Appendix B.

## 6. Sample Numbering System for Buildings/Structures

Each sample was assigned a unique sample number that was coded to denote the type of material collected. The sample identification number consists of the following:

- (1) Field operator's initials.
- (2) Date of sampling.
- (3) Building sampled.
- (4) Type of material sampled.

An example of a sample number is MB1027G72-GB, where:

- (1) MB was the field operator.
- (2) The sample was collected on October 27, 1986.
- (3) The sampling location was Building G-72.
- (4) The material sampled was the second type of flooring material sampled in the building.

## 7. Sample Numbering System for Roofs and Boilers

Each sample was assigned a unique sample number coded to denote the type of material collected. The sample identification number consists of the following:

- (1) Field operator's initials.
- (2) Date of sampling.
- (3) Building sampled
- (4) Consecutive sample number.



An example of a sample number is MB0918G72-20, where:

- (1) MB was the field operator.
- (2) The sample was collected on September 18, 1987.
- (3) The sampling location was Building G-72.
- (4) The material sampled was the twentieth sample collected and is of roofing material.

The reference numbers used in the descriptions and drawings are the final two digits of the sample numbers shown in Appendix B.

#### D. INVENTORY OF ASBESTOS IN BUILDINGS AT THE GDSCC

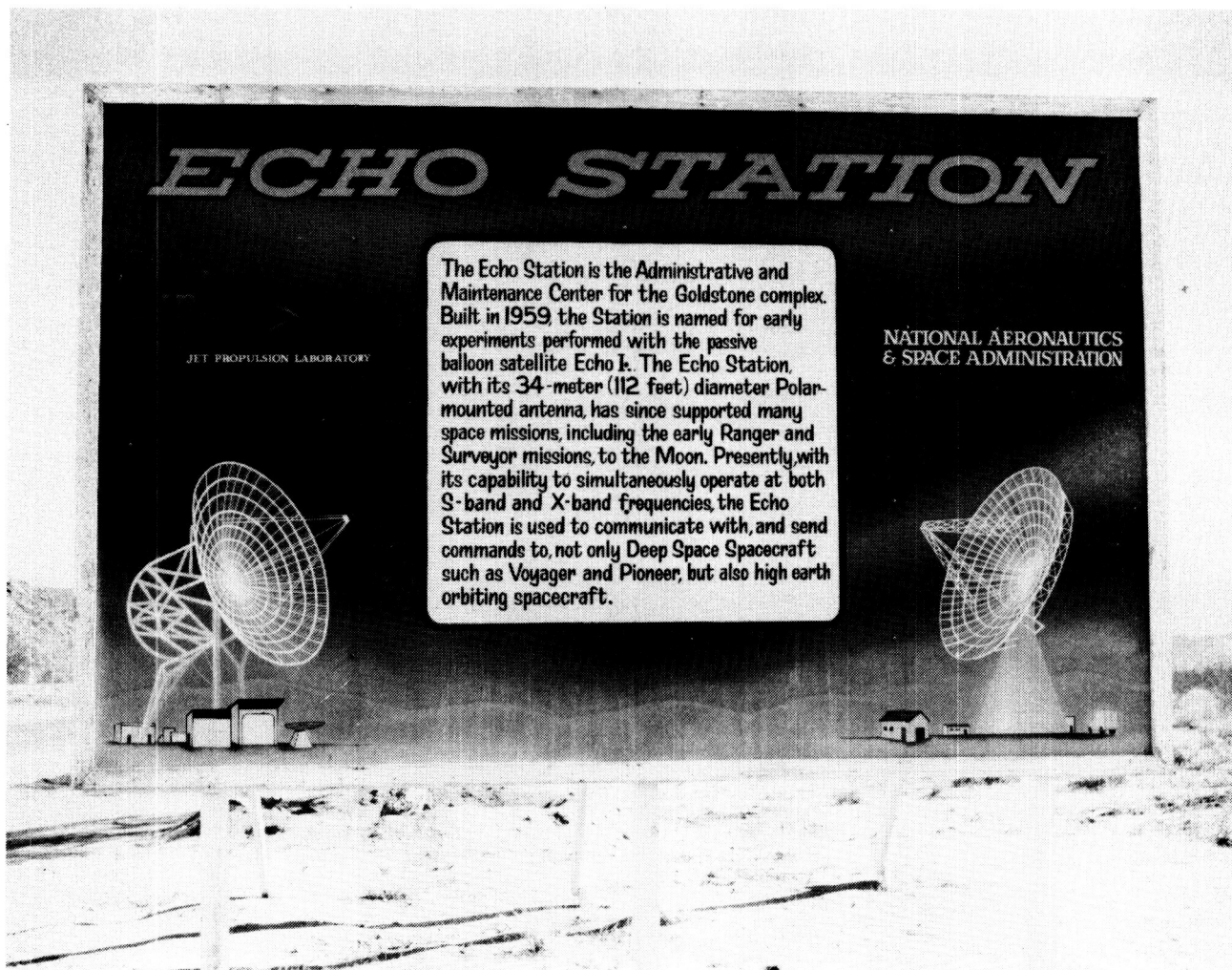
This section presents written descriptions of results of both the first field survey of buildings/structures performed October 1986 through November 1986 and of the second field survey of roofs and boilers conducted in September 1987. The descriptions are grouped by location (Pioneer, Mars, and Venus Sites) in the same order as listed in the Directory of Goldstone Buildings and Facilities (the Gold Book). One or more drawings showing the location(s) of asbestos in each building have been included with each set of written descriptions. The information provided in this subsection represents an inventory of asbestos occurrences at the GDSCC that can be used by management as a baseline for use in developing the GDSCC asbestos-management program and for planning abatement actions. The GDSCC Safety Office also should find the information contained in the inventory and drawings of use in support of its program to control worker exposure to asbestos.

# Typical Occurrences of Asbestos Found in Various Facilities at the Goldstone Deep Space Communications Complex

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

## ECHO STATION DSS 12

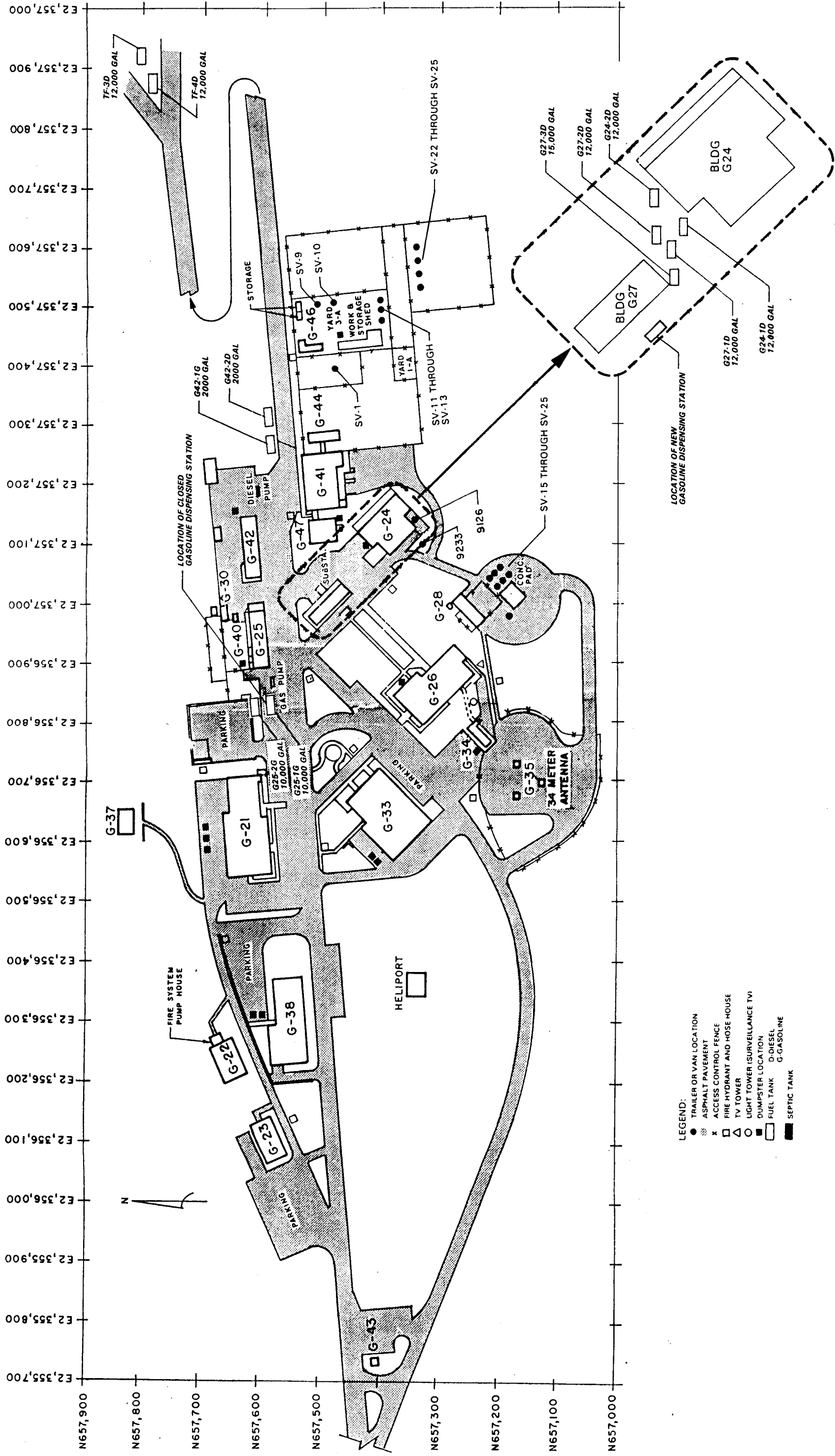


Originally built in 1959, the 26-meter (85 ft) antenna first was used in 1960 in support of the Echo Project, an experiment to transmit voice communications Coast-to-coast by bouncing radio signals off the surface of a passive balloon-type satellite. In 1978, the antenna was extended to 34-meters (111.5 ft).

PRECEDING PAGE BLANK NOT FILMED

FOLDOUT FRAME

FOLDOUT FRAME



- LEGEND:
- TRAILER OR VAN LOCATION
  - ▨ ASPHALT PAVEMENT
  - ✕ ACCESS CONTROL FENCE
  - FIRE HYDRANT AND HOSE HOUSE
  - △ TV TOWER
  - LIGHT TOWER (SURVEILLANCE TV)
  - DUMPSTER LOCATION
  - FUEL TANK D-DIESEL G-GASOLINE
  - SEPTIC TANK

ORIGINAL PAGE IS  
OF POOR QUALITY.

Figure 7. Echo Site: Plot Plan.

PRECEDING PAGE BLANK NOT FILMED



1. Building G-21 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,650/E 2,356,600  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 11860  
Building use: ADMINISTRATION AND CAFETERIA  
Summary of asbestos use(Bldg G-21): Floors, pipelines (interior)

PIPE LINES (Reference AA)

Location of pipes: RM 128  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW HAS HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 8.

PIPE LINES (Reference AC)

Location of pipes: RM 128  
Pipe diameter with insulation (in.): 6.00  
Insulation thickness (in.): 0.250  
Approximate pipe length (LF): 6.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures

1. Building G-21 (Echo Site) (Cont'd)

Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions.

Comments: HEATER EXHAUST VENT FLUE COVERING. SEE FIGURE 8.

PIPE LINES (Reference AD)

Location of pipes: RM 128  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HARD CEMENTITIOUS MATERIAL AT ELBOW. SEE FIGURE 8.

PIPE LINES (Reference AE)

Location of pipes: RM 127  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures

1. Building G-21 (Echo Site) (Cont'd)

Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

Presence of sensitive equipment: No

Suggested abatement timing: In the near future

Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 8.

PIPE LINES (Reference AG)

Location of pipes: RM 127

Pipe diameter with insulation (in.): 4.00

Insulation thickness (in.): 0.750

Approximate pipe length (LF): 1.00

Estimated insulation volume (CF): 1.00

Condition of lagging material: Some physical damage (scuffs, tears, bruises)

Types of coatings present: Cloth covering

Building use near pipes: Industrial maintenance

Work population: 1-10

Ventilation: Natural

Accessibility to area: 8-ft ladder

Obstructions to area: Permanent equipment/furnishings/structures

Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

Presence of sensitive equipment: No

Suggested abatement timing: In the near future

Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 8.

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 12 X 12 in. TILE

Friable or non-friable: Non-friable

Surface area (SF): 1270

Thickness of material (in.): 0.125

Estimated volume (CF): 13

Condition of material: Undisturbed

Types of coatings present: None

Building use near asbestos: Office/administration

Work population: 1-10

Ventilation: General forced air

Accessibility to area: Within normal reach



1. Building G-21 (Echo Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 12 X 12 in. WHITE TILE WITH SOME CARPET OVERLAY. SEE FIGURE 8.

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 153  
Thickness of material (in.): 0.062  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURE 8.

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 7700  
Thickness of material (in.): 0.125  
Estimated volume (CF): 80  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures

1. Building G-21 (Echo Site) (Cont'd)

Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

Presence of sensitive equipment: Yes

Suggested abatement timing: At time of demolition

Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. GREEN TILE WITH STREAKS LIKE THOSE USED IN BUILDING G-26. SEE FIGURE 8

The floor plan of the second floor of the FBI Building is divided into several main sections:

- Top Section (Rooms 115-119):** Includes the **CONFERENCE ROOM** (117), **PROJECTION RM** (115A), and several **OFFICE** spaces (115, 115A, 115B, 119).
- Left Section (Rooms 120-125):** Contains a cluster of **OFFICE** spaces (120, 120A, 120B, 121, 122, 123, 124, 125) and a **SECRETARIAL AREA** (123).
- Center Section (Rooms 126-129):** Features a **REPRODUCTION ROOM** (102), **SEC. AREA** (101A), and several **OFFICE** spaces (101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129).
- Right Section (Rooms 130-135):** Includes a **DINING ROOM** (130), **KITCHEN** (131), **FREEZER** (132), **DRY FOOD** (133), and a **PLANTER** (134).
- Bottom Section (Rooms 136-139):** Contains a **REPRODUCTION ROOM** (136), **SEC. AREA** (137), and several **OFFICE** spaces (138, 139).

Key areas and rooms include:

- 117 CONFERENCE ROOM**
- 115A PROJECTION RM**
- 115 OFFICE**
- 115A OFFICE**
- 115B OFFICE**
- 119 OFFICE**
- 120 OFFICE**
- 120A OFFICE**
- 120B OFFICE**
- 121 OFFICE**
- 122 OFFICE**
- 123 OFFICE**
- 124 OFFICE**
- 125 OFFICE**
- 126 OFFICE**
- 127 OFFICE**
- 128 OFFICE**
- 129 OFFICE**
- 130 DINING ROOM**
- 131 KITCHEN**
- 132 FREEZER**
- 133 DRY FOOD**
- 134 PLANTER**
- 136 REPRODUCTION ROOM**
- 137 SEC. AREA**
- 138 OFFICE**
- 139 OFFICE**

Figure 8. Echo Site: Administration and Cafeteria Building G-21.

PAGE 6-24 INTENTIONALLY BLANK

ORIGINAL PAGE IS  
OF POOR QUALITY



Figure 9. Typical Asbestos-Containing Floor Tiles in Building G-21  
and in Many Other Buildings at the GDSCC.

PRECEDING PAGE BLANK NOT FILMED

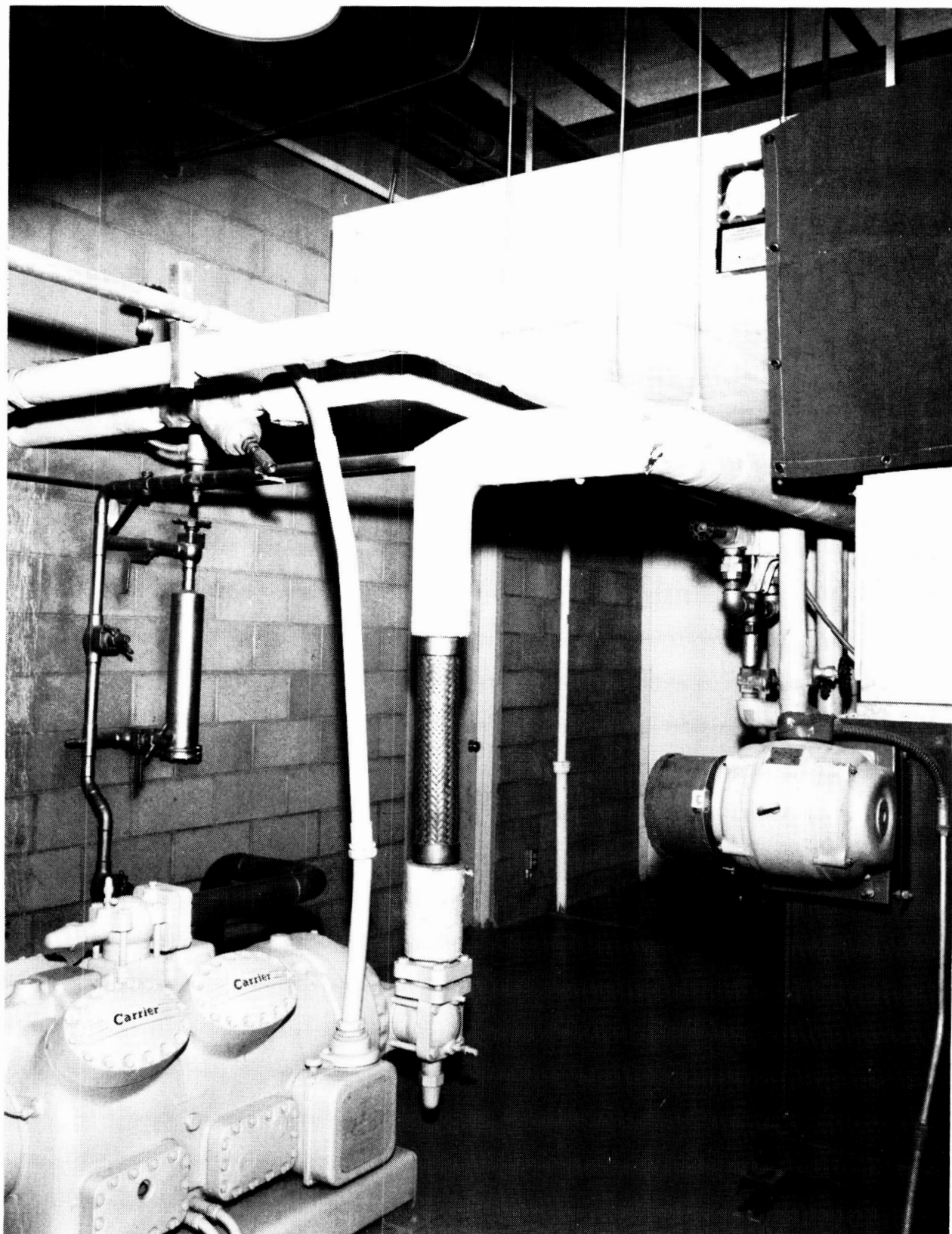


Figure 10. Echo Site: Building G-21, Mechanical Equipment Room 127, Asbestos-Containing Pipe Lagging.

ORIGINAL PAGE IS  
OF POOR QUALITY

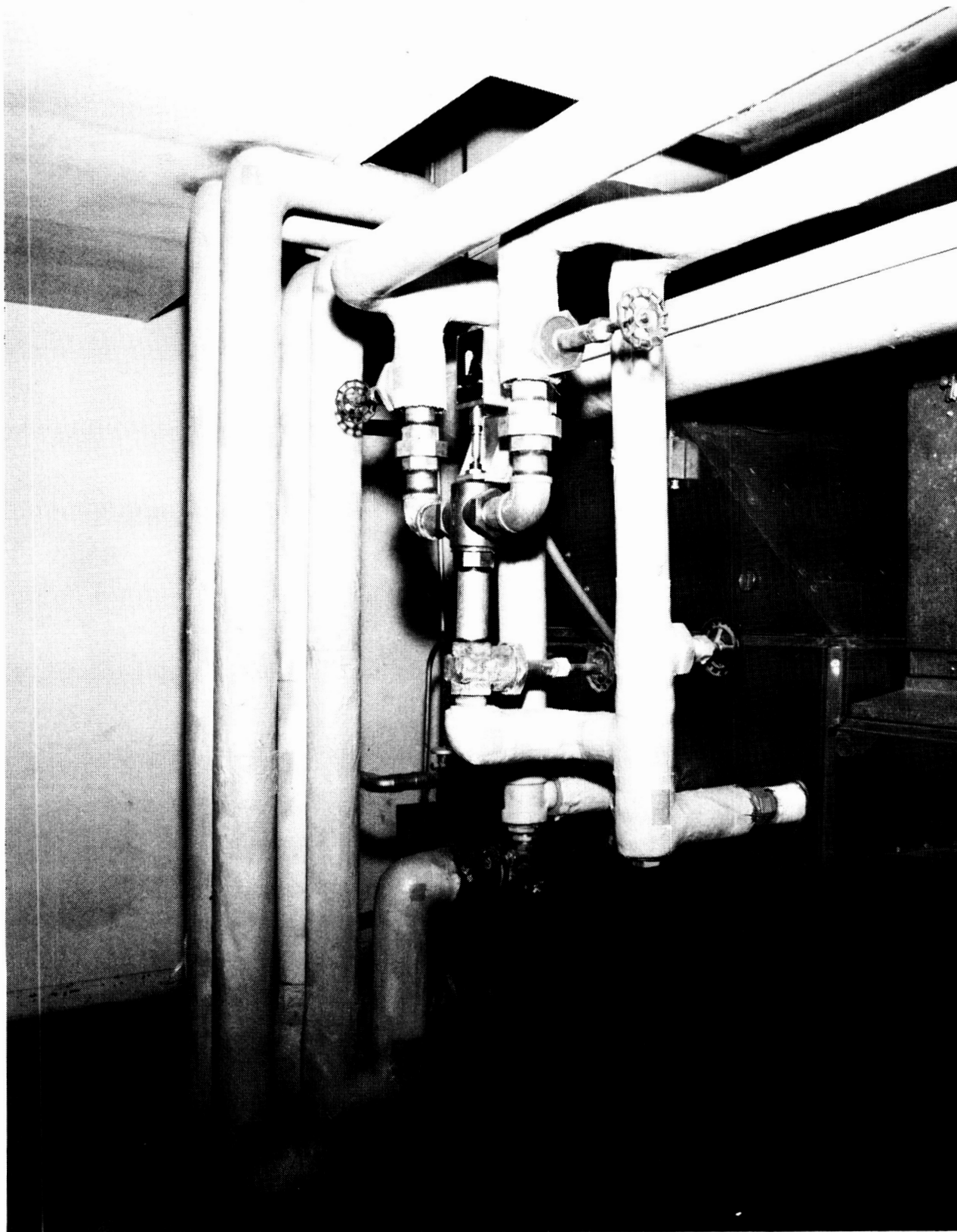


Figure 11. Echo Site: Building G-21, Mechanical Equipment Room 127,  
Asbestos-Containing Pipe Lagging.



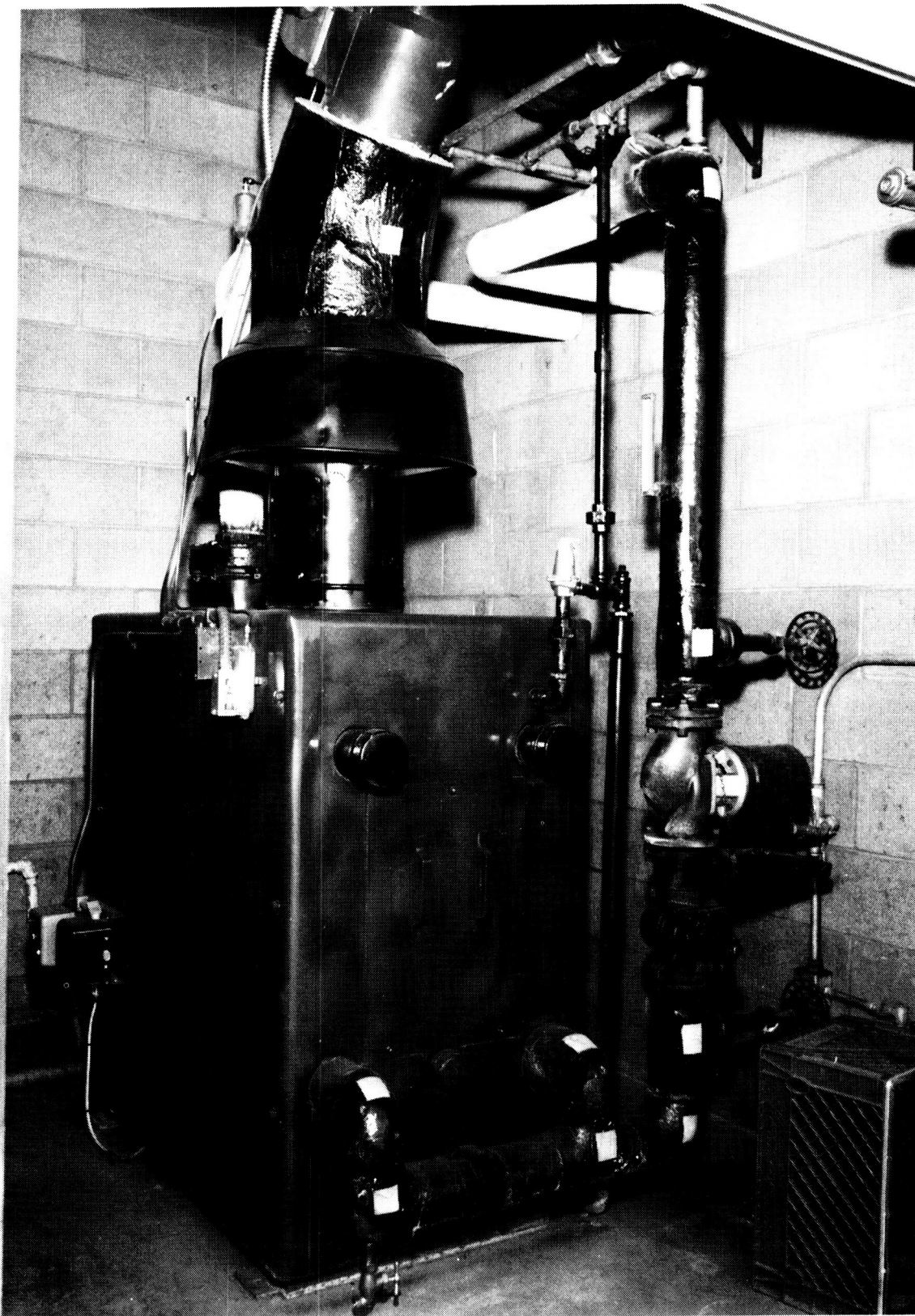


Figure 12. Echo Site: Building G-21, Boiler Room 128, Asbestos-Containing Pipe Lagging.

2. Building G-22 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,650/E 2,356,200  
Construction date: 1971  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 350  
Building use: FIRE LINE PUMP HOUSE  
Summary of asbestos use (Bldg G-22): Pipe lines (exterior)

PIPE LINES (Reference AA)

Location of pipes: East side of building  
Pipe diameter with insulation (in.): 12  
Insulation thickness (in.): 1.5  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: None  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW HAS HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 13



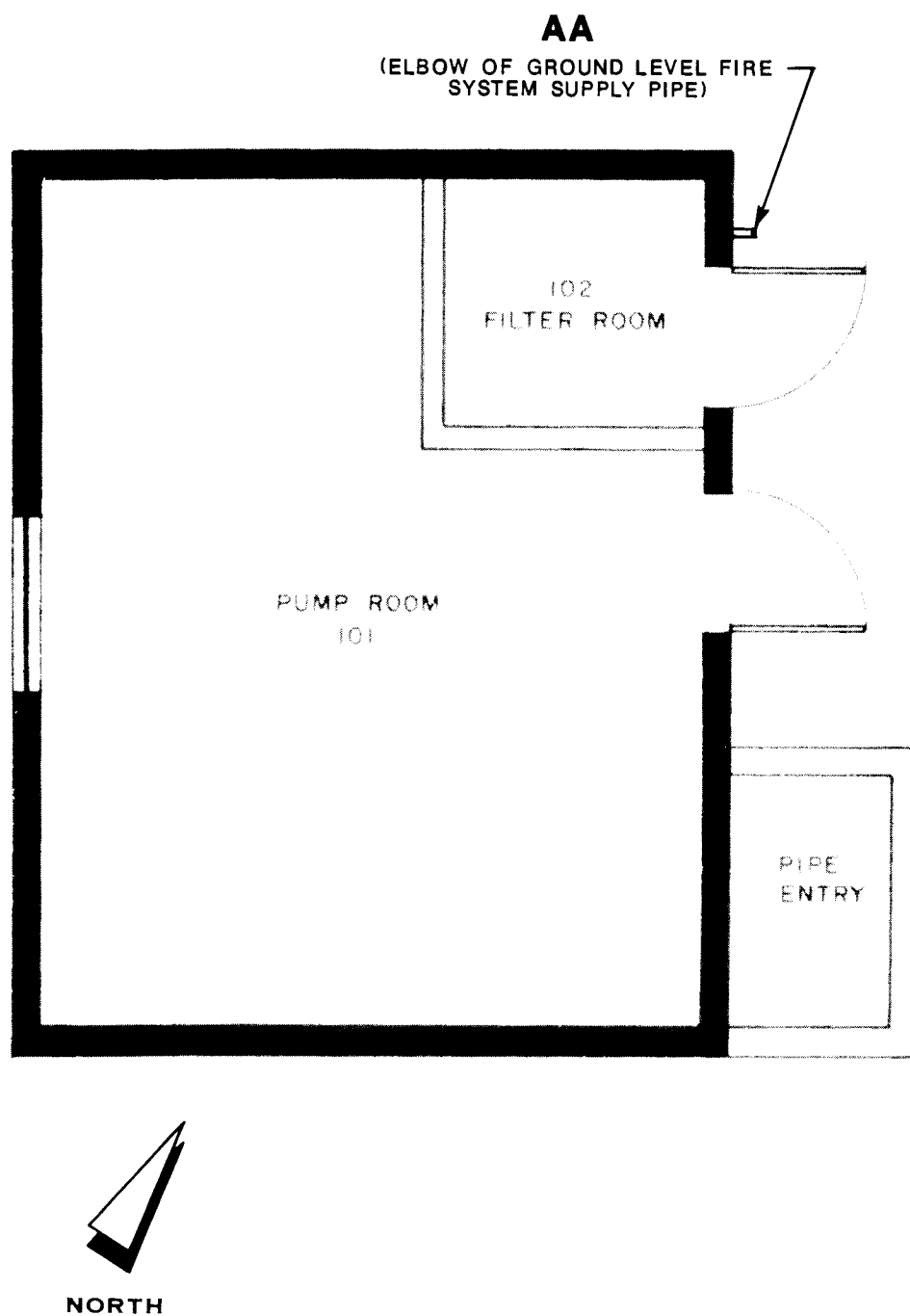


Figure 13. Echo Site: Fire Line Pump House G-22.



Figure 14. Echo Site: Asbestos-Containing Insulation around Fire System Water Supply Pipe Exterior to Fire Line Pump House G-22, Typical Asbestos-Containing Insulation Covering Exterior Pipes that Enter or Leave Buildings G-22, G-27, G-38, G-58 and M-6 at the GDSCC.

3. Building G-23 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,600/E 2,356,100  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 3120  
Building use: DORMITORY  
Summary of asbestos use (Bldg G-23): Floors, pipelines  
(interior), steam vessels (interior)

PIPE LINES (Reference AD)

Location of pipes: RM 108  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.75  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW HAS HARD CEMENTITIOUS MATERIAL. SEE FIGURE 15

PIPE LINES (Reference AF)

Location of pipes: RM 108  
Pipe diameter with insulation (in.): 4.50  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 2.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder

C - 2

3. Building G-23 (Echo Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 15

PIPE LINES (Reference AI)

Location of pipes: RM 107  
Pipe diameter with insulation (in.): 6.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 7.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: EXHAUST PIPE LAGGING. SEE FIGURE 15

PIPE LINES (Reference AK)

Location of pipes: RM 107  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural

3. Building G-23 (Echo Site) (Cont'd)

Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HARD CEMENTITIOUS MATERIAL ON PIPING NEAR ELBOW. SEE FIGURE 15

PIPE LINES (Reference AM)

Location of pipes: RM 107  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.125  
Approximate pipe length (LF): 45.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HARD CEMENTITIOUS MATERIAL ON PIPING NEAR ELBOW. SEE FIGURE 15

STEAM VESSELS (Reference FA)

Location of asbestos-bearing material: RM 107 Interior  
Friable or non-friable: Friable  
Diameter of vessel (ft): 3  
Length of vessel (ft): 6.00  
Thickness of material (in.): 1.000  
Estimated volume of asbestos (CF): 6  
Condition of material: Undisturbed  
Types of coatings present: Cloth covering  
Building use near asbestos: Industrial maintenance  
Work population: None  
Ventilation: Natural

3. Building G-23 (Echo Site) (Cont'd)

Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future (within 6 mo)  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: BOILER ROOM ACCESSED FROM OUTSIDE AND IS IN A TIGHT SPACE.  
SEE FIGURE 15

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 2443  
Thickness of material (in.): 0.125  
Estimated volume (CF): 25  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Other  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BEIGE AND BROWN FLOOR TILE. ACTIVITY USE IS FOR A DORMITORY AND INFIRMARY. SEE FIGURE 15

6-41



Figure 15. Echo Site: Dormitory Building G-23.

ORIGINAL PAGE IS  
OF POOR QUALITY

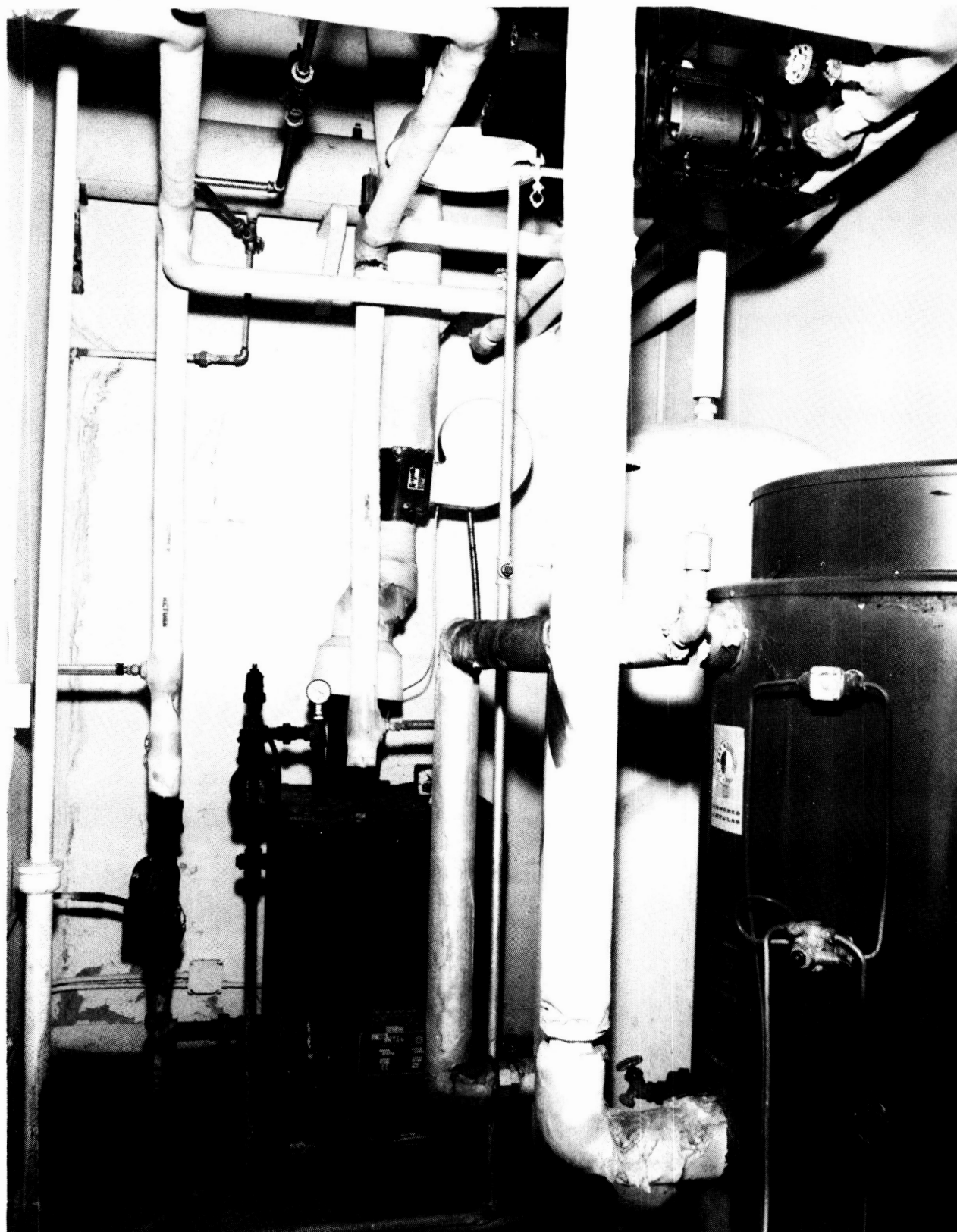


Figure 16. Echo Site: Building G-23, Boiler Room 107, Asbestos-Containing Pipe Lagging.



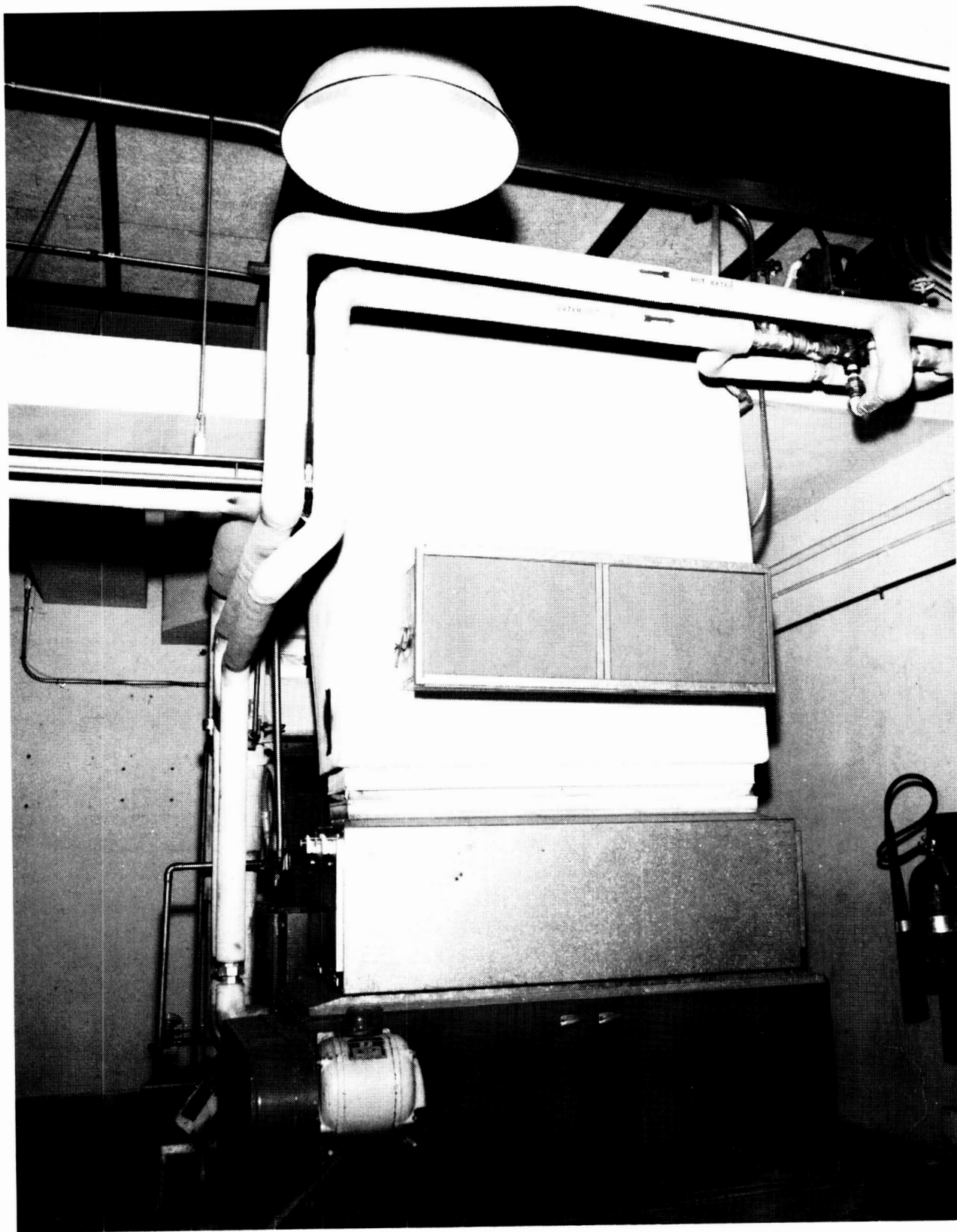


Figure 17. Echo Site: Building G-23, Mechanical Equipment Room 108, Asbestos-Containing Pipe Lagging.

4. Building G-24 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,400/E 2,357,125  
Construction date: 1973  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 4765  
Building use: GENERATOR BUILDING  
Summary of asbestos use (Bldg G-24): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 12 X 12 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1270  
Thickness of material (in.): 0.125  
Estimated volume (CF): 13  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 12 X 12 in. WHITE WITH GRAY STREAK TILE. SEE FIGURE 18

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 12 X 12 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 24  
Thickness of material (in.): 0.125  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: None  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

4. Building G-24 (Echo Site) (Cont'd)

Presence of sensitive equipment: Yes

Suggested abatement timing: At time of demolition

Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: 12 X 12 in. WHITE WITH GRAY STREAK TILE USED FOR REPLACEMENT. SEE FIGURE 18

ORIGINAL PAGE IS  
OF POOR QUALITY

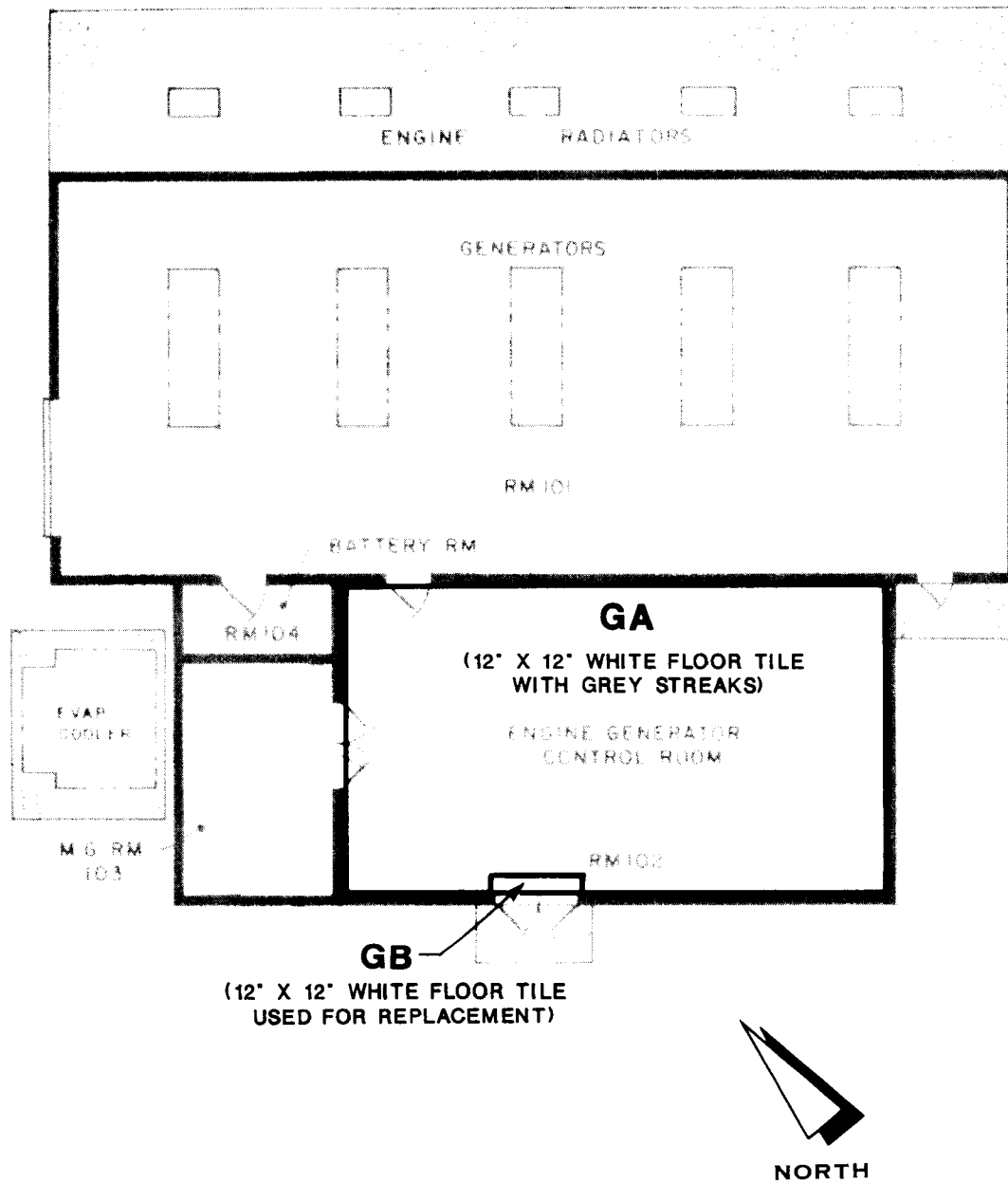


Figure 18. Echo Site: Generator Building G-24.

5. Building G-25 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,600/E 2,356,800  
Construction date: 1958  
Building type: Butler-type  
Number of floors: 2  
Total floor area (SF): 3264  
Building use: TRANSPORTATION/MAINTENANCE BUILDING  
Summary of asbestos use (Bldg G-25): Floors

FLOORING MATERIALS (Reference GD)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 240  
Thickness of material (in.): 0.125  
Estimated volume (CF): 3  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BROWN TILE LIKE ROOM 124 IN BUILDING G-26. SEE FIGURE 19

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

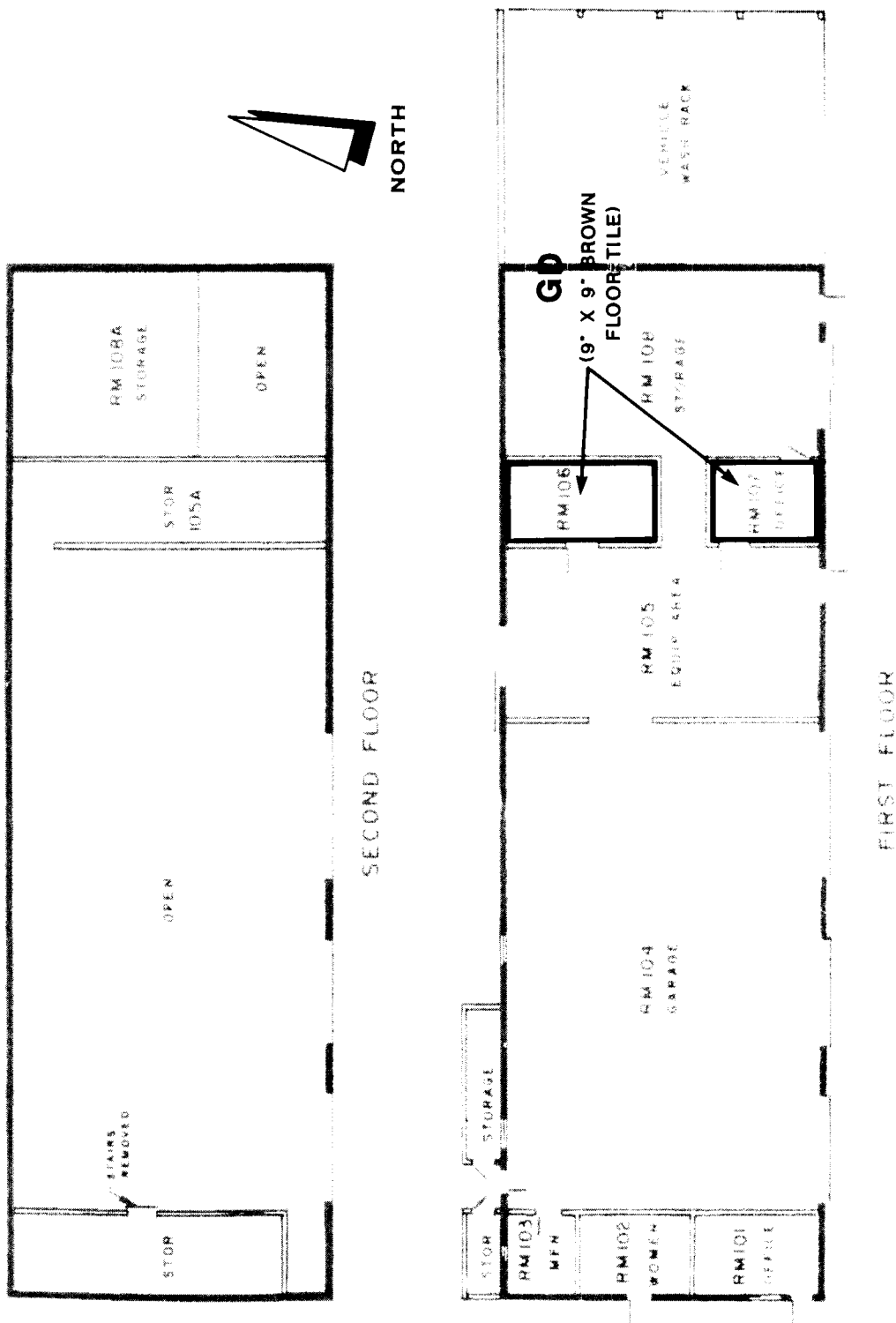


Figure 19. Echo Site: Transportation Maintenance Building G-25.

PRECEDING PAGE BLANK NOT FILMED

6. Building G-26 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,300/E 2,356,900  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 11508  
Building use: CONTROL BUILDING  
Summary of asbestos use (Bldg G-26): Floors, pipelines (interior), boiler insulation, roofing material

PIPE LINES (Reference AA)

Location of pipes: RM 109  
Pipe diameter with insulation (in.): 3.75  
Insulation thickness (in.): 0.50  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 20

PIPE LINES (Reference AC)

Location of pipes: RM 109  
Pipe diameter with insulation (in.): 3.75  
Insulation thickness (in.): 0.50  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder

6. Building G-26 (Echo Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 20

PIPE LINES (Reference AE)

Location of pipes: RM 109  
Pipe diameter with insulation (in.): 3.75  
Insulation thickness (in.): 0.50  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 20

PIPE LINES (Reference AG)

Location of pipes: RM 110  
Pipe diameter with insulation (in.): 3.75  
Insulation thickness (in.): 0.50  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage, (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10



6. Building G-26 (Echo Site) (Cont'd)

Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 20

PIPE LINES (Reference AJ)

Location of pipes: RM 108  
Pipe diameter with insulation (in.): 3.75  
Insulation thickness (in.): 0.50  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 20

PIPE LINES (Reference AL)

Location of pipes: RM 108  
Pipe diameter with insulation (in.): 3.75  
Insulation thickness (in.): 0.50  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance

6. Building G-26 (Echo Site) (Cont'd)

Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 20

WALL STRUCTURES/PARTITIONS (Reference CA)

Asbestos-bearing material found in: Wall structure  
Friable or non-friable: Non-friable  
Surface area (SF): 672  
Thickness of material (in.): 0.75  
Estimated volume of asbestos (CF): 42  
Condition of material: Undisturbed  
Types of coatings present: Coatings/encapsulants  
Building use near asbestos: Casual or incidental  
Work population: 1-10  
Ventilation : General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: TAPE VAULT WALLS ARE IN GOOD CONDITION. MAINTAIN A GOOD PROTECTIVE COATING ON WALLS. SEE FIGURE 20

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1  
Thickness of material (in.): 0.125  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration

6. Building G-26 (Echo Site) (Cont'd)

Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: None  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. LIGHT-GREEN TILE USED FOR REPLACEMENT. SEE FIGURE 20

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1510  
Thickness of material (in.): 0.125  
Estimated volume (CF): 15  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. LIGHT-GREEN TILE WITH WHITE STREAKS. PRIMARY FLOOR USED IN BUILDING. SEE FIGURE 20

FLOORING MATERIALS (Reference GD)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 320  
Thickness of material (in.): 0.25  
Estimated volume (CF): 7  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10

6. Building G-26 (Echo Site) (Cont'd)

Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. LIGHT-BROWN TILE PRIMARILY USED IN ROOM 124. SEE FIGURE 20

BOILER INSULATION (Reference 31)

Location of asbestos-containing material: RM 130 (Interior)  
Friable or non-friable: Friable  
Area of insulation (SF): 1.29  
Thickness of material (in.): 2.75  
Estimated volume of asbestos (CF): 0.3  
Condition of material: Undisturbed  
Types of coatings present: Metal covering  
Building use near asbestos: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of renovation, repair, or damage  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: BOILER ROOM ACCESSED FROM OUTSIDE AND IS IN A TIGHT SPACE. SEE FIGURE 21.

ROOF MATERIAL (References 15,16,18)

Asbestos-containing material found in: ROOFING  
Friable or non-friable: Non-friable  
Surface area (SF): 11,508  
Thickness of material (in.): 2.00  
Estimated volume (CF): 1918  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Support  
Work population: None

6. Building G-26 (Echo Site) (Cont'd)

Ventilation: Natural

Accessibility to area: > 8-ft ladder

Obstructions to area: Permanent equipment/furnishings/structures

Physical disturbances: Normal vibrations from fans, closing doors, noise, etc.


Presence of sensitive equipment: No

Suggested abatement timing: At time of demolition

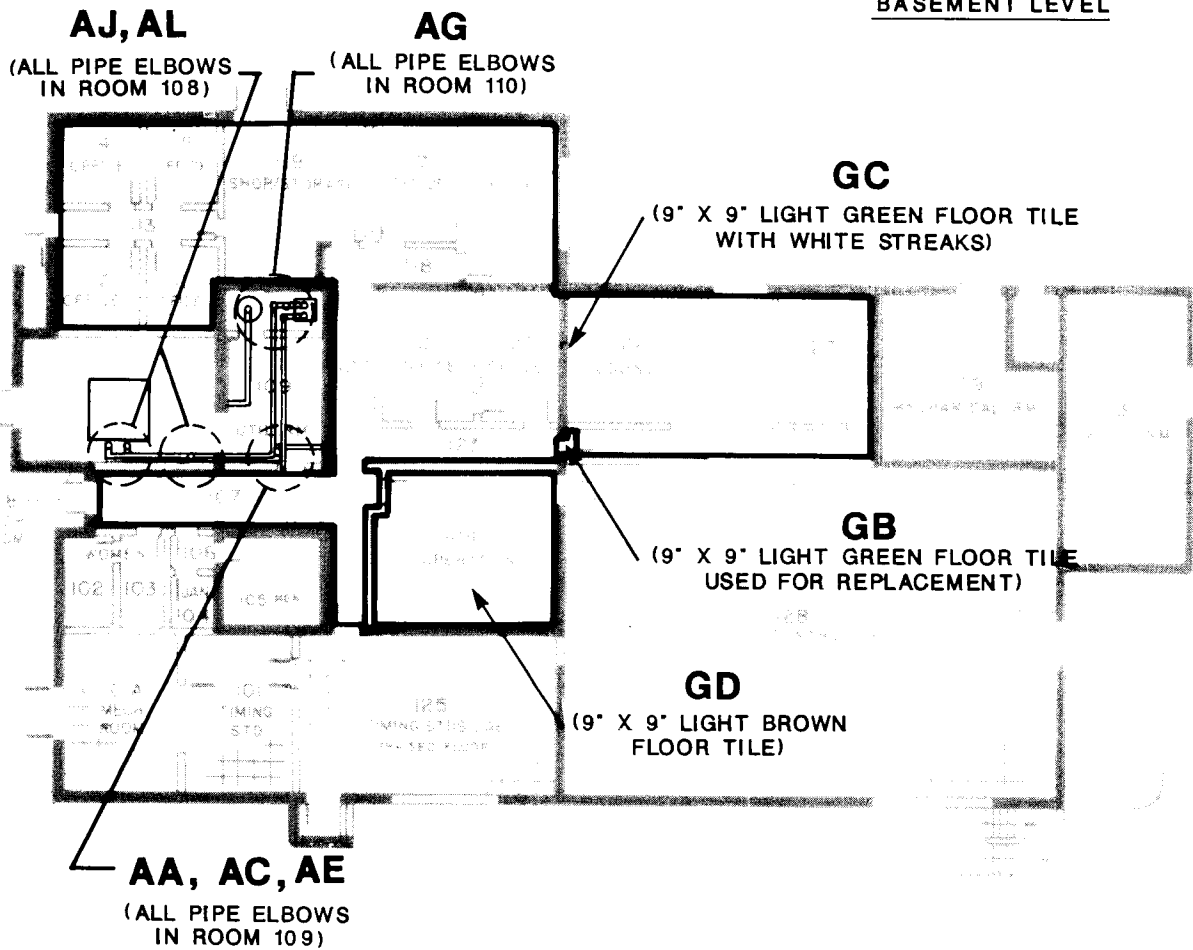
Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: ROOF MATERIAL COVERED WITH TAR. SEE FIGURE 21



**NORTH**



PRECEDING PAGE BLANK NOT FILMED

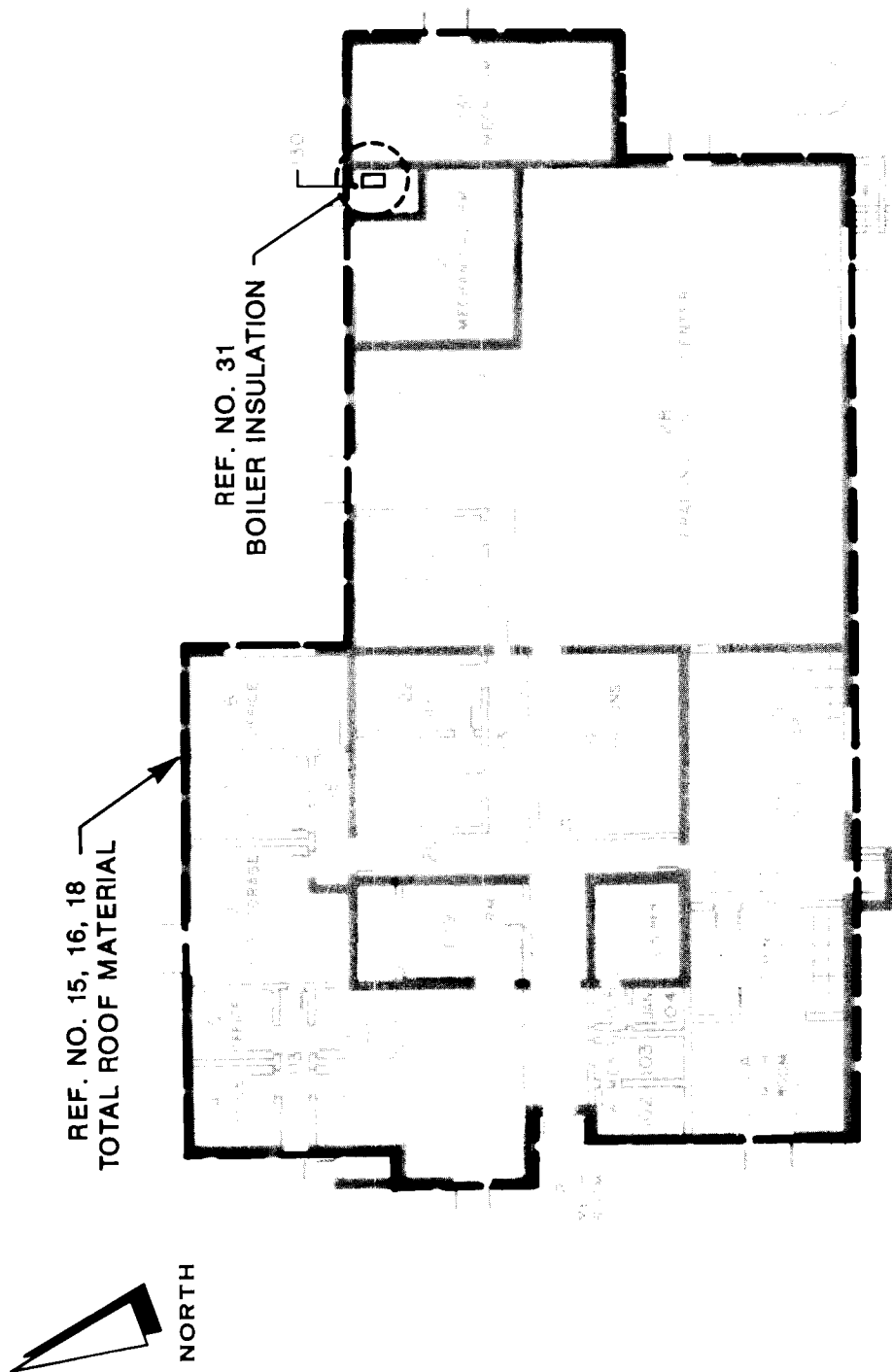


Figure 21. Echo Site: Control Building G-26.

ORIGINAL PAGE IS  
OF POOR QUALITY

ORIGINAL PAGE IS  
OF POOR QUALITY



Figure 22. Echo Site: Building G-26, Mechanical Equipment Room 108, Asbestos-Containing Pipe Lagging.



ORIGINAL PAGE IS  
OF POOR QUALITY



Figure 23. Echo Site: Building G-26, Boiler Room 110, Toward Ceiling, Asbestos-Containing Pipe Lagging.

ORIGINAL PAGE IS  
OF POOR QUALITY



Figure 24. Echo Site: Building G-26, Boiler Room 110, Toward Floor, Asbestos-Containing Pipe Lagging.

ORIGINAL PAGE IS  
OF POOR QUALITY

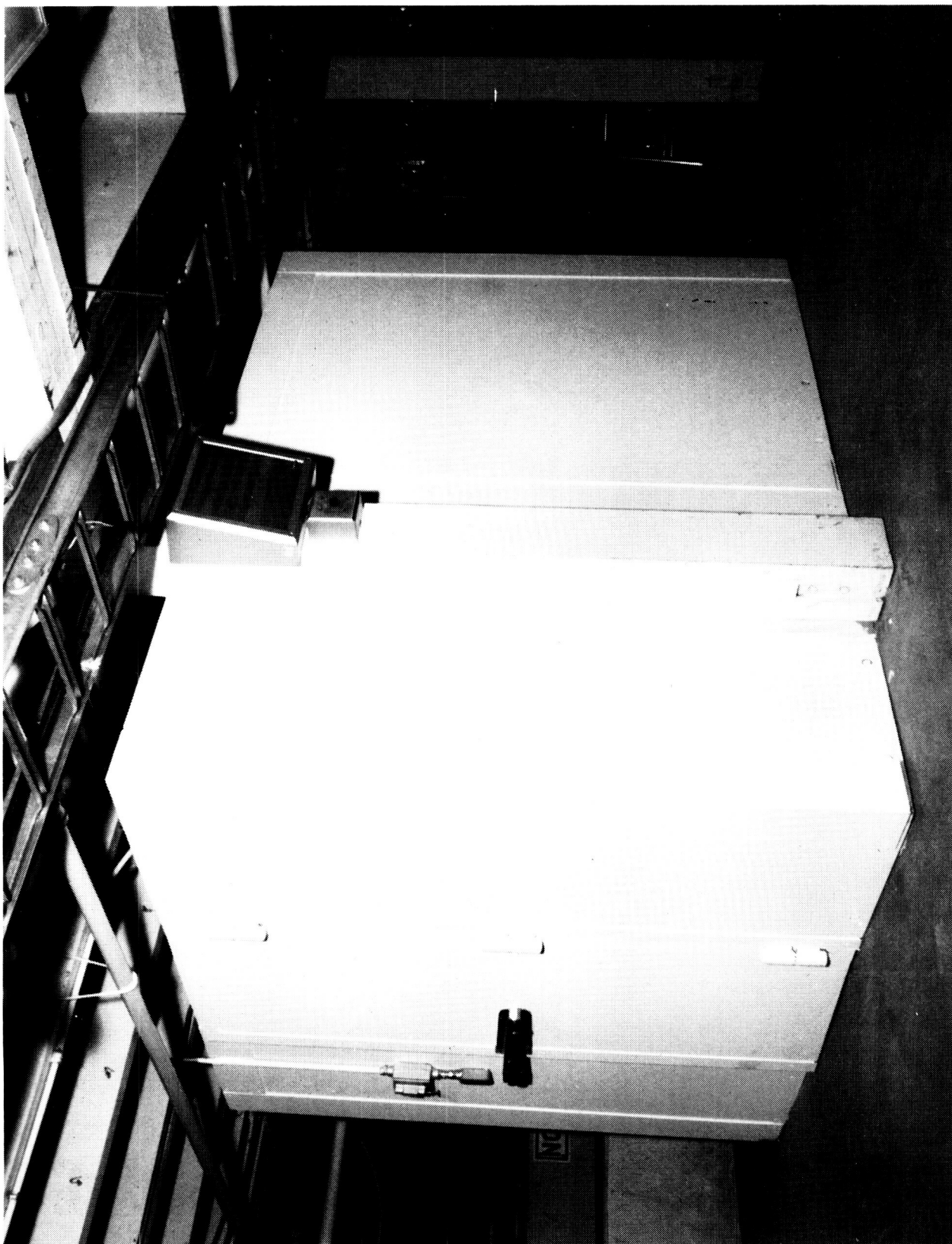


Figure 25. Echo Site: Building G-26, Tape Vaults Room 128P, Typical Tape Vaults  
Constructed of Asbestos-Containing Transite Board.

7. Building G-27 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,500/E 2,357,000  
Construction date: 1958  
Building type: Butler type  
Number of floors: 1  
Total floor area (SF): 2016  
Building use: OFFICE/STORAGE  
Summary of asbestos use (Bldg G-27): Pipe lines (exterior)

PIPE LINES (Reference AA)

Location of pipes: West side of building  
Pipe diameter with insulation (in.): 12  
Insulation thickness (in.): 1.5  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: None  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE  
EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 26

ORIGINAL PAGE IS  
OF POOR QUALITY

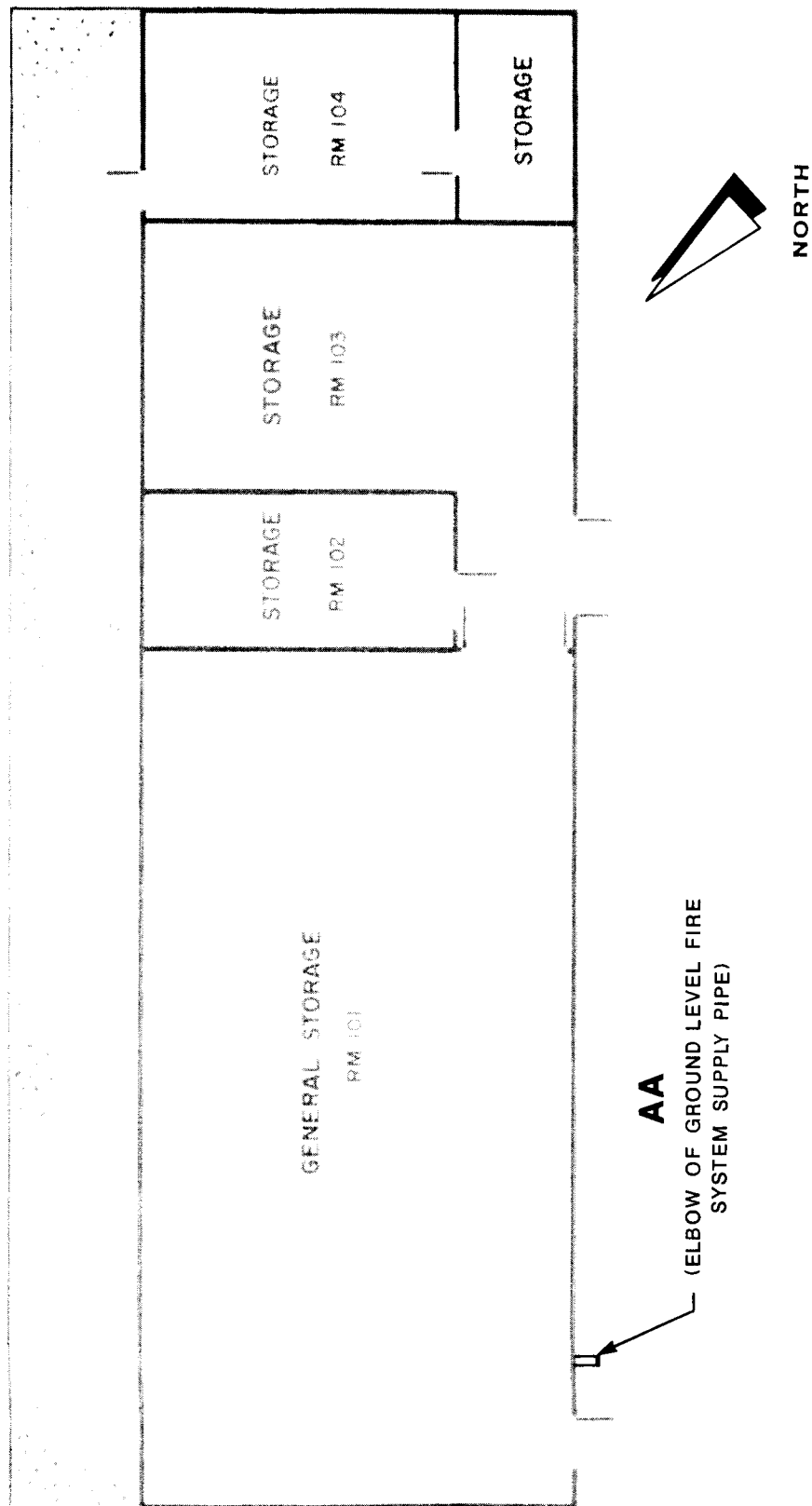


Figure 26. Echo Site: Office and Storage Building G-27.

PRECEDING PAGE BLANK NOT FILMED

8. Building G-33 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,400/E 2,356,650  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 12738  
Building use: ENGINEERING/COMMUNICATIONS  
Summary of asbestos use (Bldg G-33): Floors, pipelines (interior)

PIPE LINES (Reference AC)

Location of pipes: RM 133  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW MATERIAL HARD CEMENTITIOUS. USED AT ENDS OF STRAIGHT RUNS AS WELL. SEE FIGURE 27

PIPE LINES (Reference AD)

Location of pipes: RM 134  
Pipe diameter with insulation (in.): 6.00  
Insulation thickness (in.): 0.250  
Approximate pipe length (LF): 6.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder

8. Building G-33 (Echo Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HEATER EXHAUST VENT FLUE COVERING. SEE FIGURE 27

PIPE LINES (Reference AG)

Location of pipes: RM 134  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW MATERIAL HARD CEMENTITIOUS. SEE FIGURE 27

PIPE LINES (Reference AK)

Location of pipes: RM 140  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder

8. Building G-33 (Echo Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW MATERIAL HARD CEMENTITIOUS. TOTAL OF 45 ELBOWS IN ROOM. SEE FIGURE 27

PIPE LINES (Reference AL)

Location of pipes: RM 140  
Pipe diameter with insulation (in.): 6.00  
Insulation thickness (in.): 0.250  
Approximate pipe length (LF): 6.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HEATER EXHAUST FLUE INSULATION. SEE FIGURE 27

PIPE LINES (Reference AN)

Location of pipes: RM 140  
Pipe diameter with insulation (in.): 2.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural



8. Building G-33 (Echo Site) (Cont'd)

Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW MATERIAL HARD CEMENTITIOUS. TOTAL OF 17 ELBOWS IN ROOM. SEE FIGURE 27

PIPE LINES (Reference AP)

Location of pipes: RM 141  
Pipe diameter with insulation (in.): 6.00  
Insulation thickness (in.): 1.00  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW MATERIAL HARD CEMENTITIOUS. TOTAL OF 24 ELBOWS IN ROOM. SEE FIGURE 27

PIPE LINES (Reference AR)

Location of pipes: RM 141  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering

8. Building G-33 (Echo Site) (Cont'd)

Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW MATERIAL HARD CEMENTITIOUS. TOTAL OF 45 ELBOWS IN ROOM. SEE FIGURE 27

PIPE LINES (Reference AT)

Location of pipes: RM 138  
Pipe diameter with insulation (in.): 2.50  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW MATERIAL HARD CEMENTITIOUS. TOTAL OF 4 ELBOWS IN ROOM. SEE FIGURE 27

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 6426  
Thickness of material (in.): 0.125  
Estimated volume (CF): 67  
Condition of material: Undisturbed  
Types of coatings present: None

8. Building G-33 (Echo Site) (Cont'd)

Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 x 9 in. DARK GREEN TILE WITH BLEACH STREAKS. SEE FIGURE 27

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 20  
Thickness of material (in.): 0.125  
Estimated volume (CF): 1  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 x 9 in. LIGHT GREEN TILE WITH BLEACH STREAKS USED AS REPLACEMENT TILE. SEE FIGURE 27

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1280  
Thickness of material (in.): 0.125  
Estimated volume (CF): 13  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None

8. Building G-33 (Echo Site) (Cont'd)

Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 x 9 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURE 27

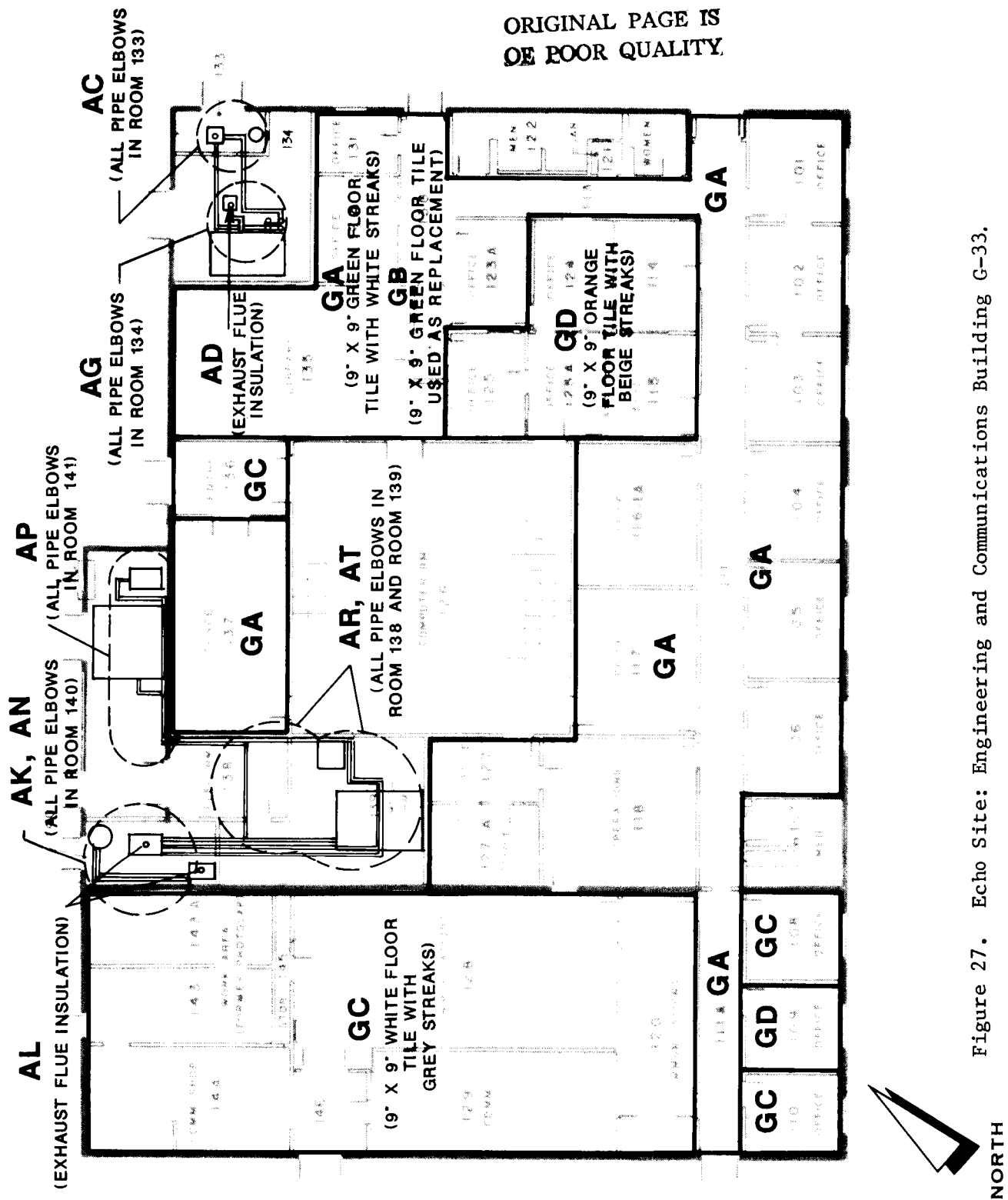
FLOORING MATERIALS (Reference GD)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 2010  
Thickness of material (in.): 0.125  
Estimated volume (CF): 21  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9x 9 in. ORANGE TILE WITH BEIGE STREAKS. SEE FIGURE 27

ENCLOSING PAGE SLACK NOT FILMED

PAGE 6-18 INTENTIONALLY BLANK



ORIGINAL PAGE IS  
OF POOR QUALITY

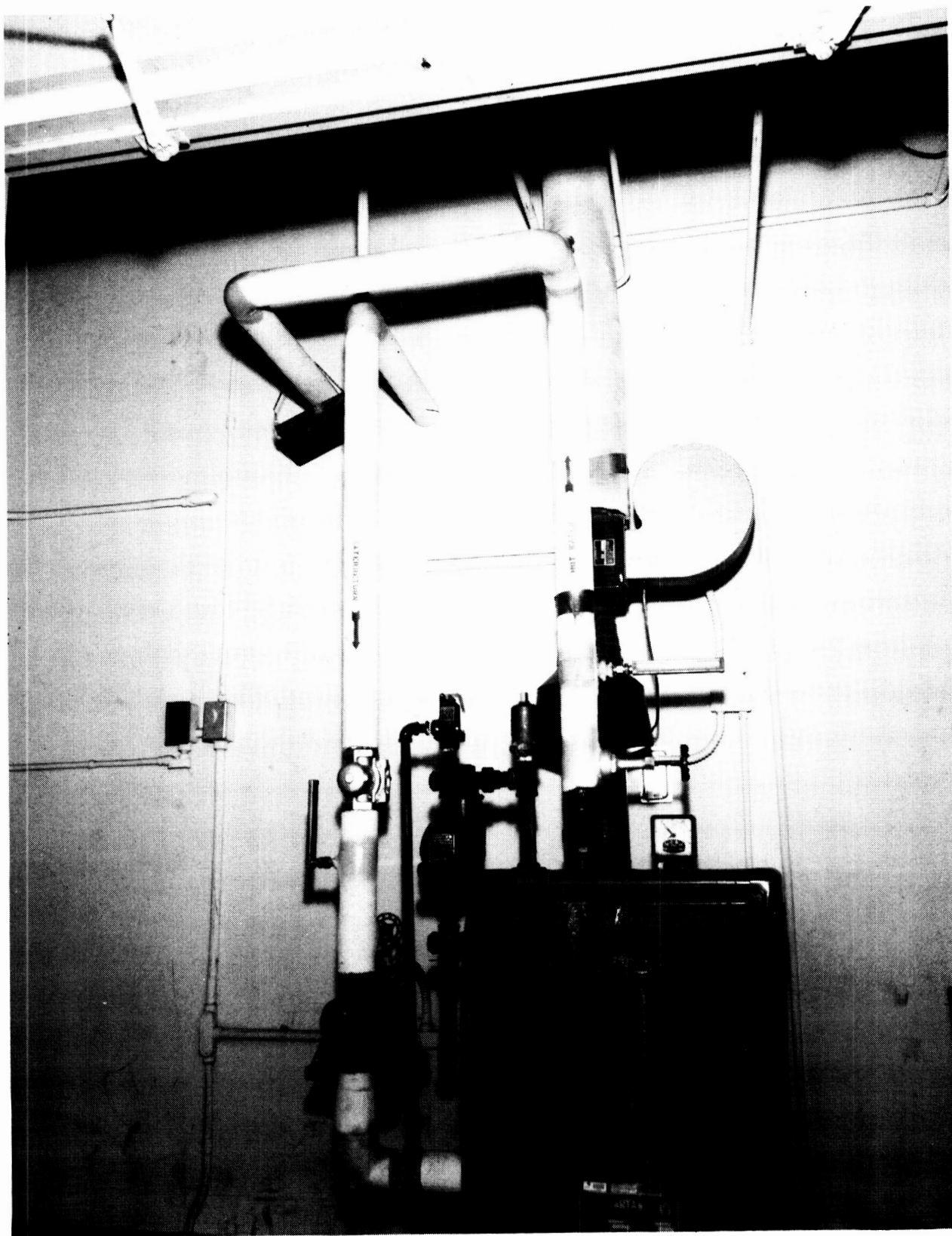


Figure 28. Echo Site: Building G-33, Boiler Room 133, Asbestos-Containing Pipe Lagging.

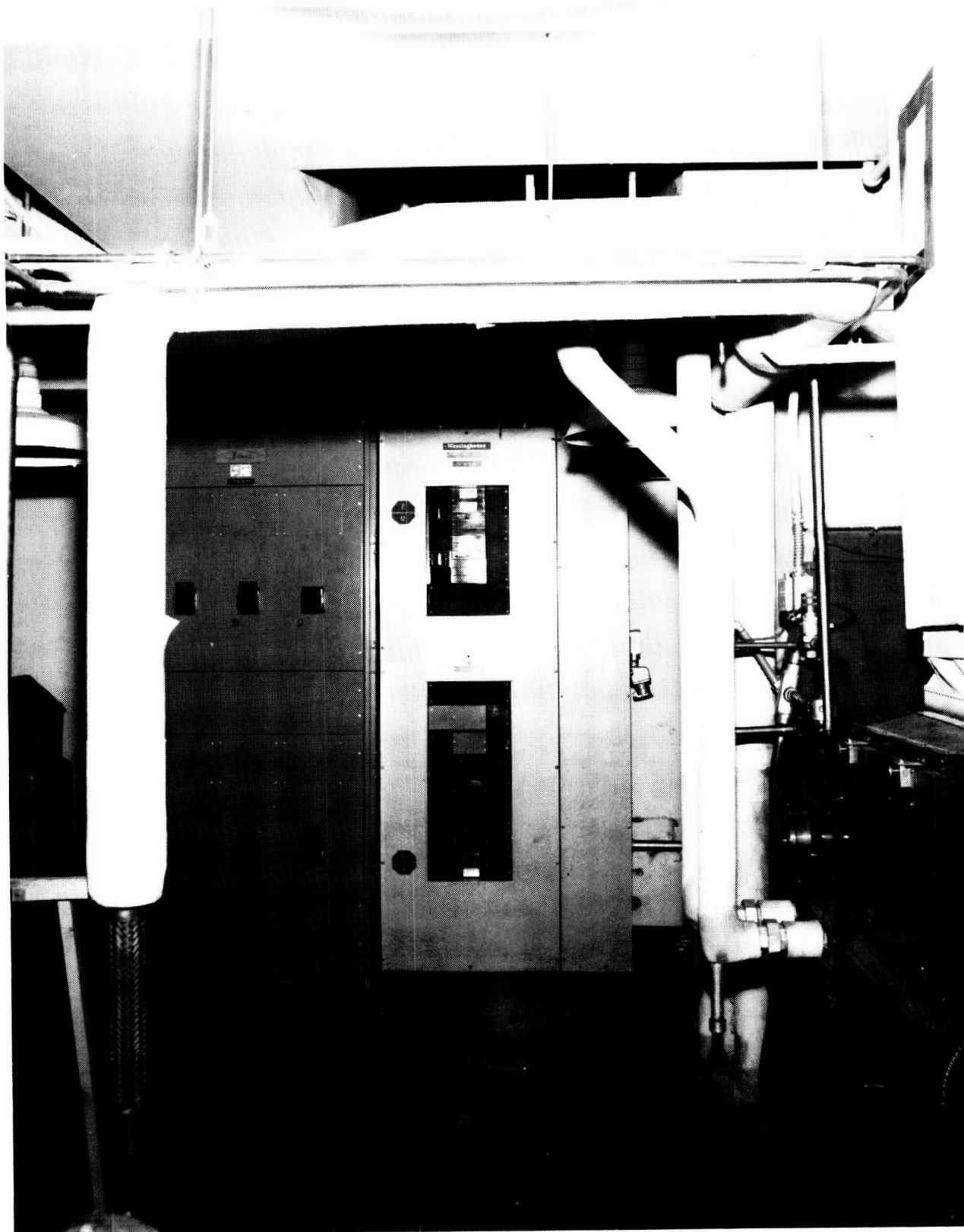


Figure 29. Echo Site: Building G-33, Mechanical Equipment Room 134, Asbestos-Containing Pipe Lagging.

ORIGINAL PAGE IS  
OF POOR QUALITY

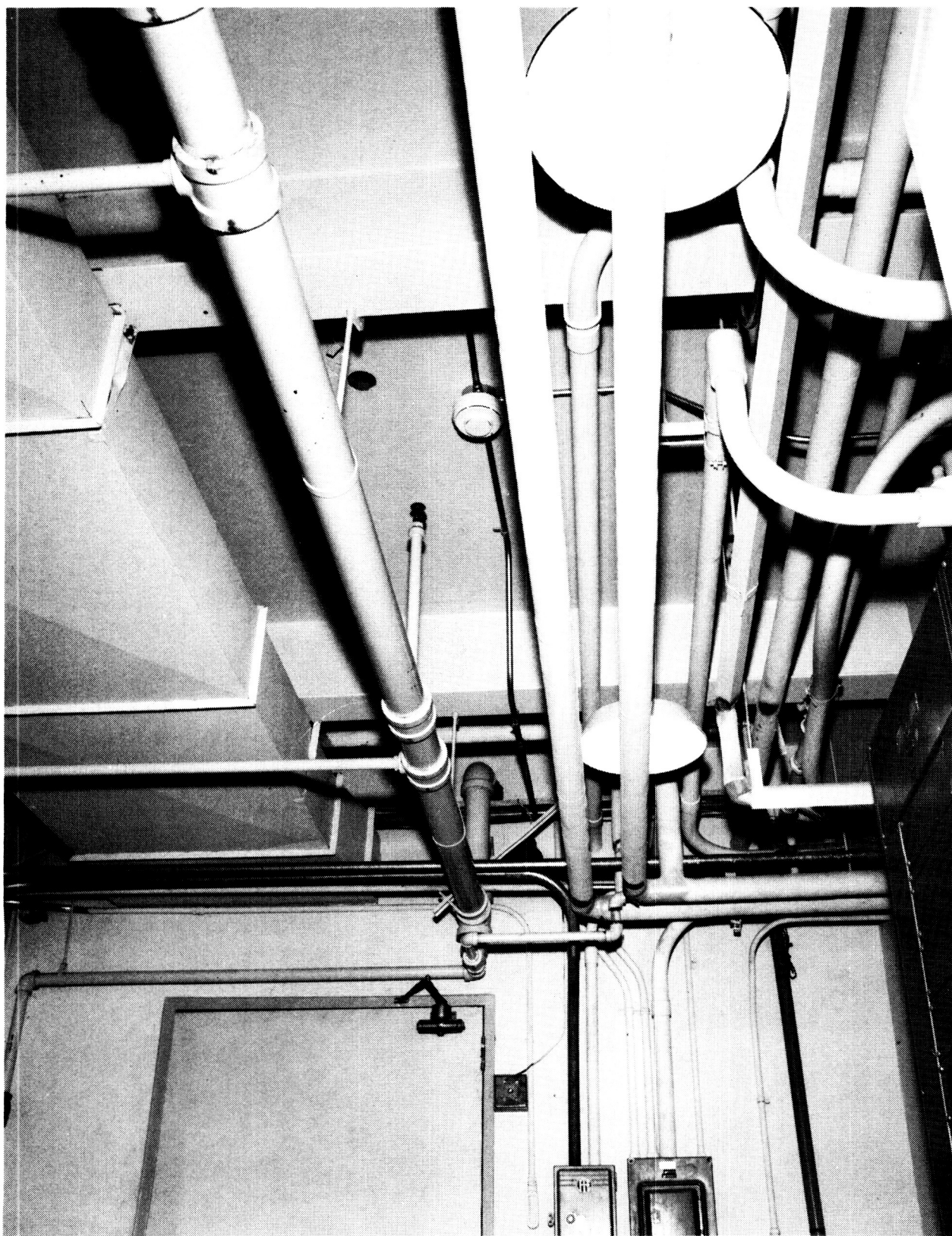


Figure 30. Echo Site: Building G-33, Electrical Room 138, Asbestos-Containing Pipe Lagging.



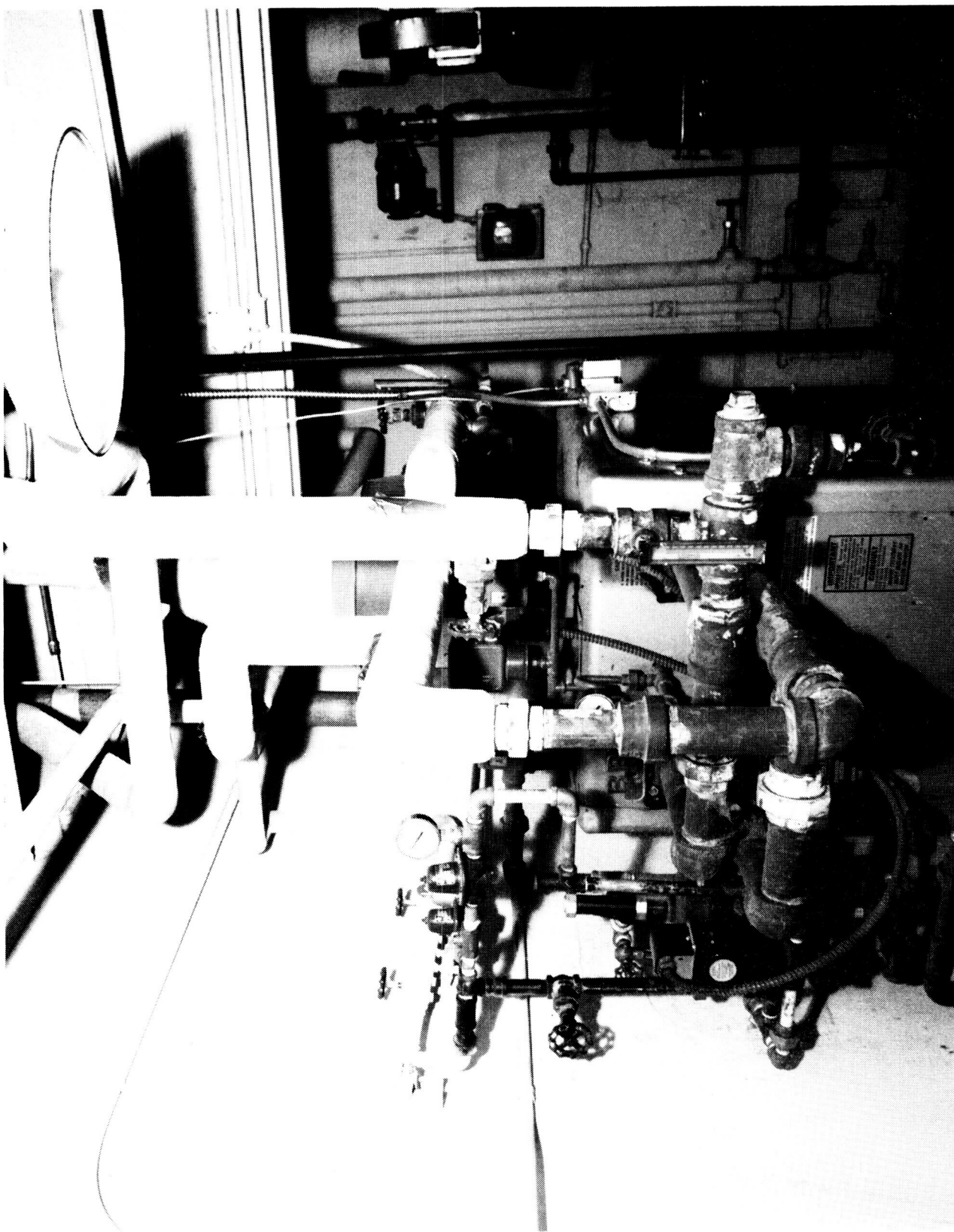


Figure 31. Echo Site: Building G-33, Boiler Room 140, Asbestos-Containing Pipe Lagging.

ORIGINAL PAGE IS  
OF POOR QUALITY

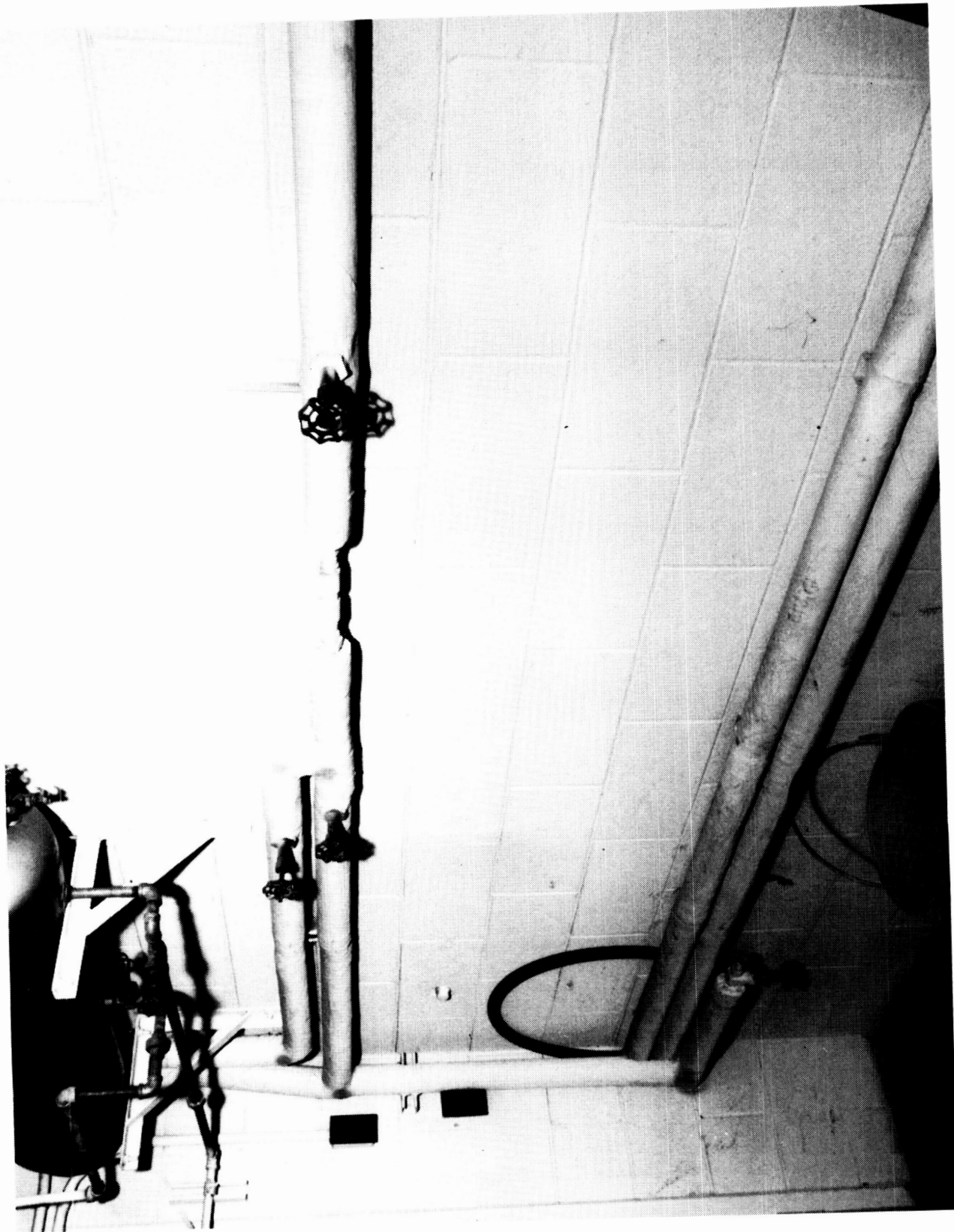


Figure 32. Echo Site: Building G-33, Boiler Room 140, Asbestos-Containing Pipe Lagging.

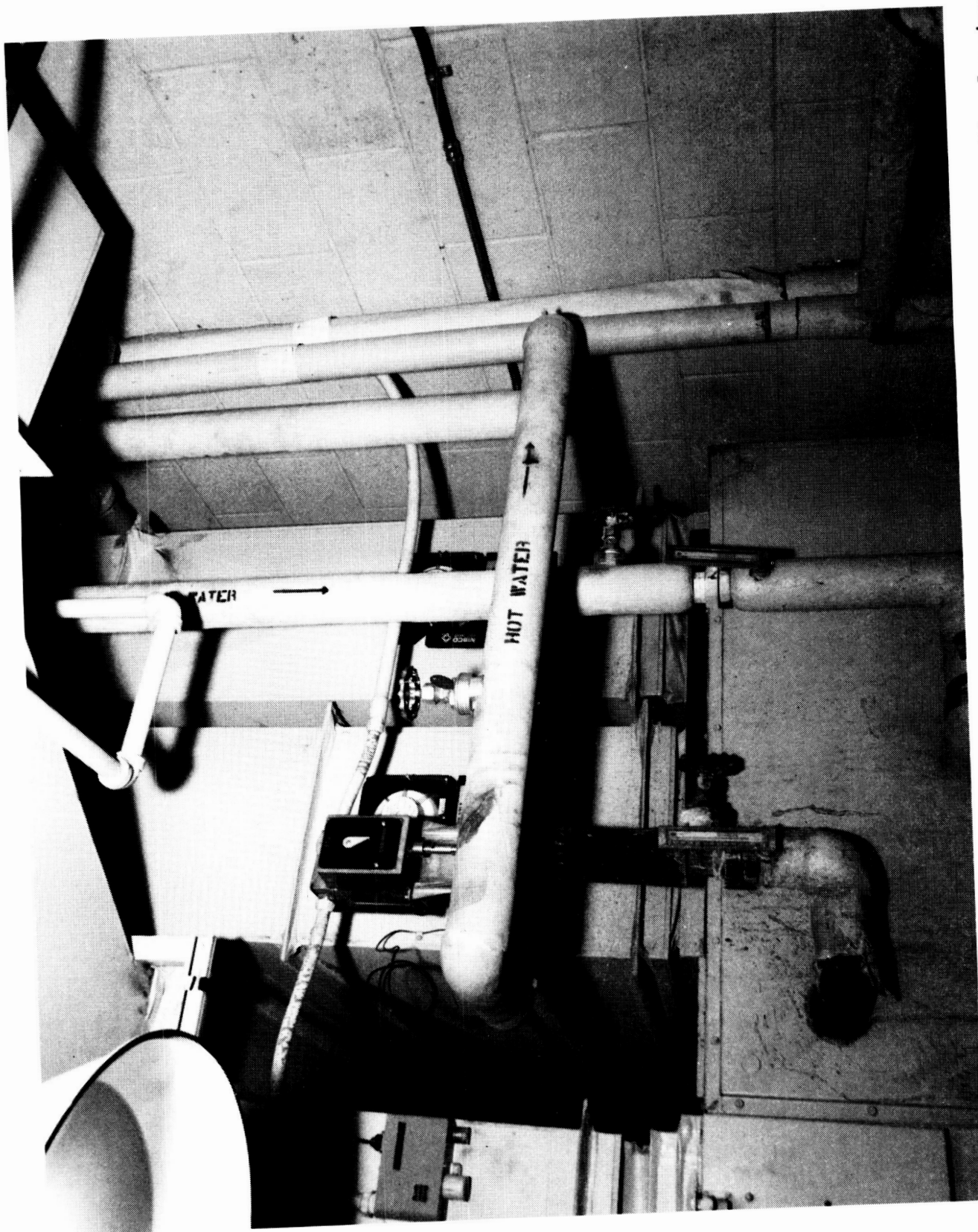


Figure 33. Echo Site: Building G-33, Mechanical Equipment Room 141, Asbestos-Containing Pipe Lagging.



ORIGINAL PAGE IS  
OF POOR QUALITY

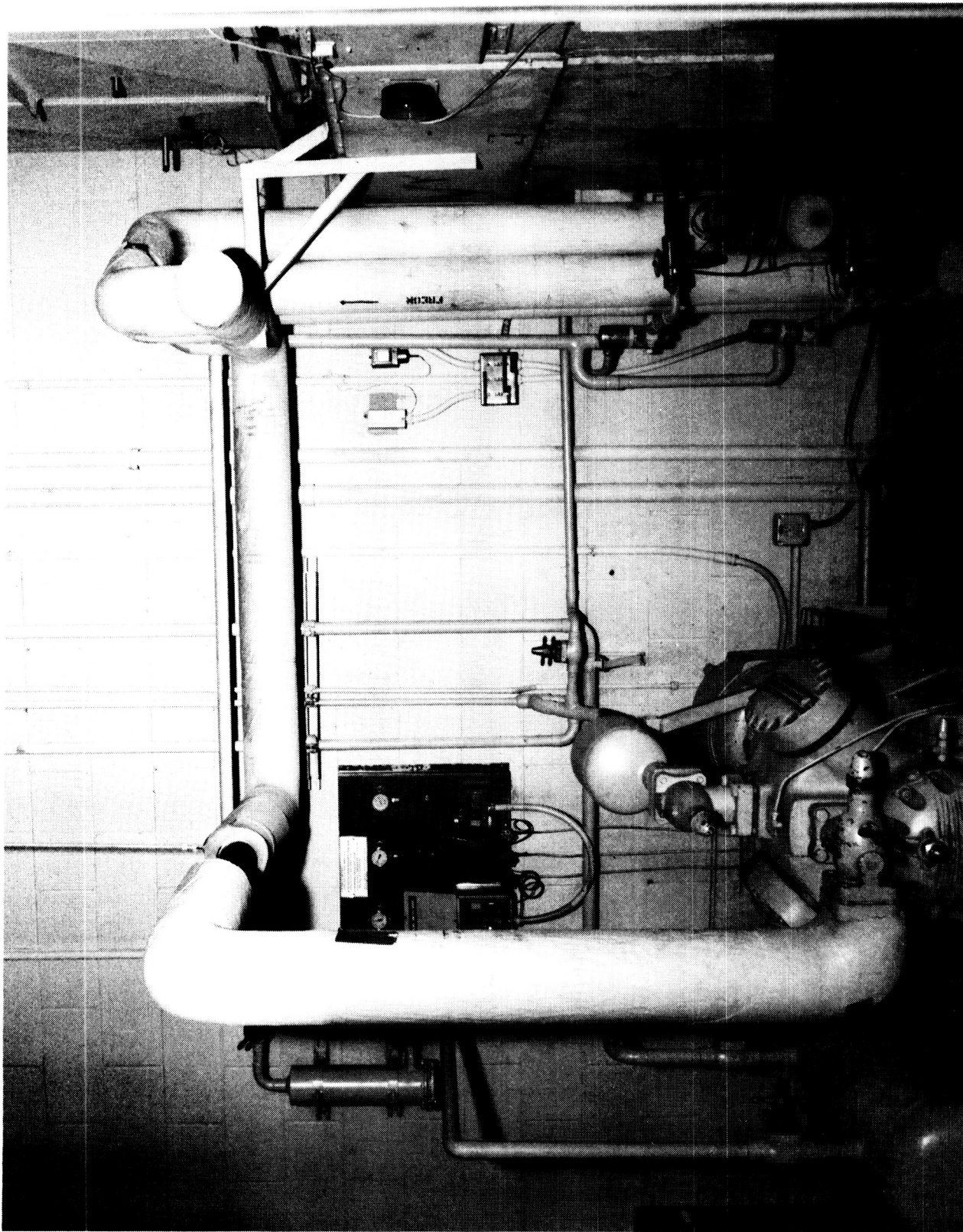


Figure 34. Echo Site: Building G-33, Mechanical Equipment Room 141, Asbestos-Containing Pipe Lagging.

9. Building G-36 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: 1964  
Building type: Frame  
Number of floors: 1  
Total floor area (SF): 289  
Building use: COLLIMATION TOWER SUPPORT  
Summary of asbestos use (Bldg G-36): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 289  
Thickness of material (in.): 0.062  
Estimated volume (CF): 2  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Unoccupied at present  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BROWN TILE WITH MULTI-COLORED SPECKS. SEE FIGURE 35

**PRECEDING PAGE BLANK NOT FILMED**

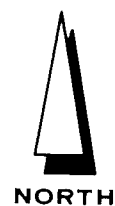
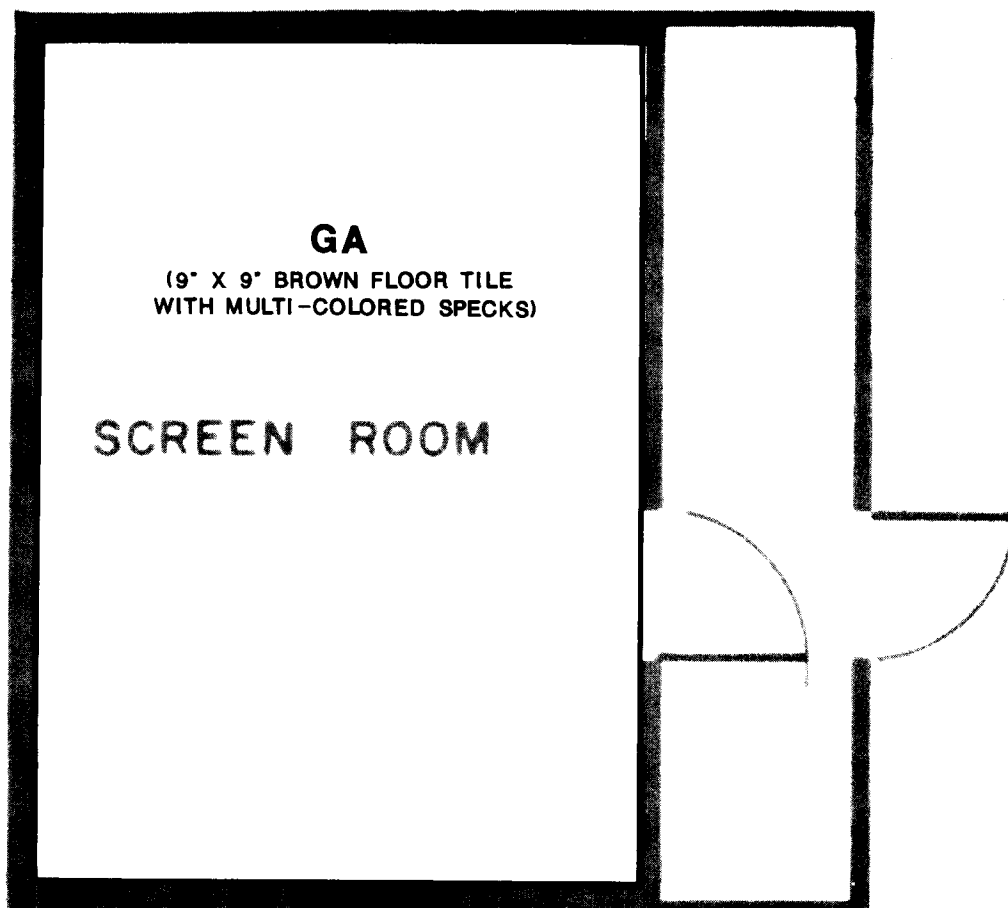


Figure 35. Echo Site: Collimation Tower Building G-36.

PRECEDING PAGE BLANK NOT FILMED

10. Building G-37 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,850/E 2,356,650  
Construction date: 1963  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 540  
Building use: SEISMIC LABORATORY  
Summary of asbestos use (Bldg G-37): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 492  
Thickness of material (in.): 0.062  
Estimated volume (CF): 3  
Condition of material: Some water damage  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. GREEN TILE WITH WHITE STREAKS. SEE FIGURE 36

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

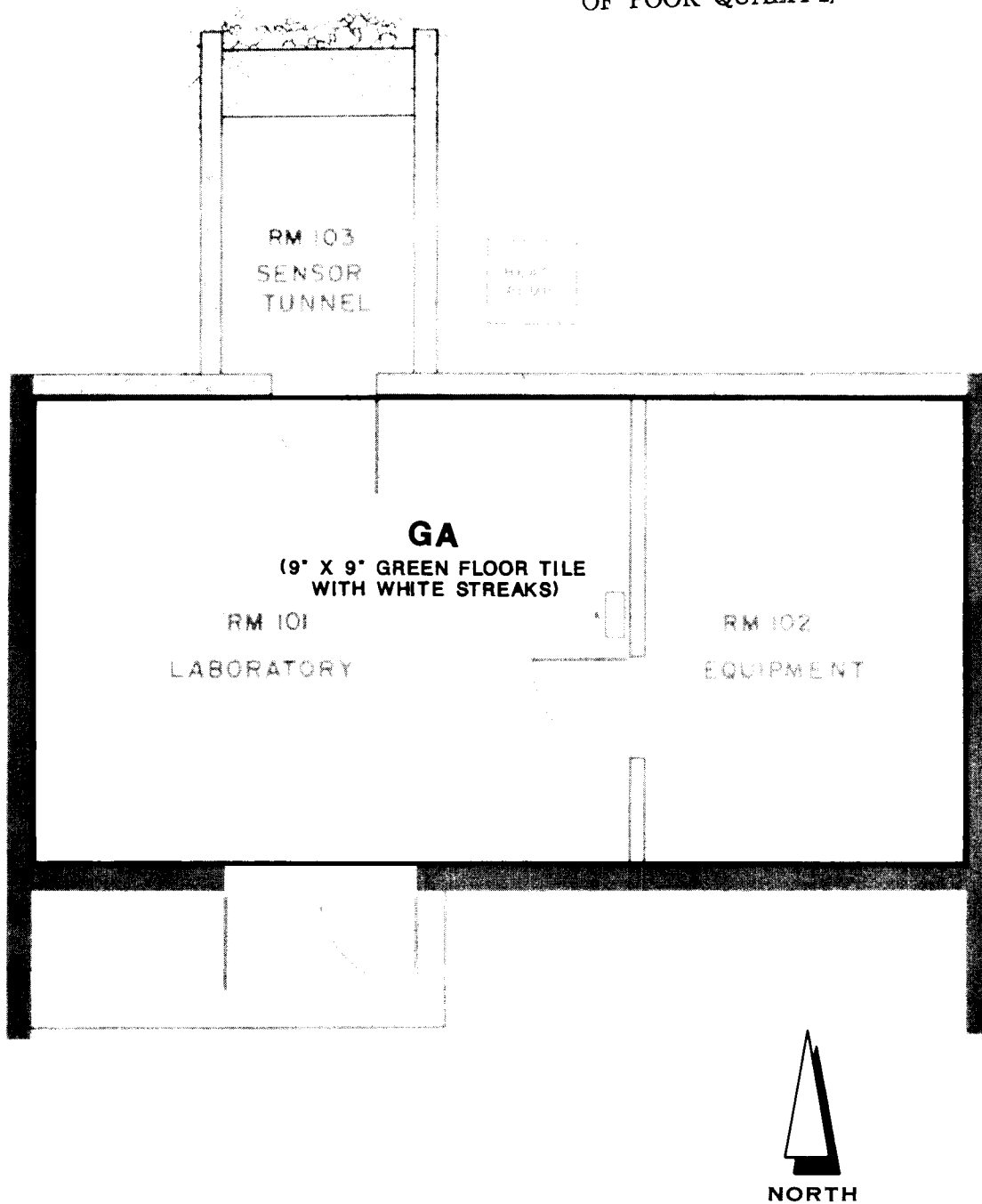


Figure 36. Echo Site: Seismic Laboratory Building G-37.

PRECEDING PAGE BLANK NOT FILMED



11. Building G-38 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,500/E 2,356,300  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 9396  
Building use: NETWORK LABORATORY AND MAINTENANCE FACILITY  
Summary of asbestos use (Bldg G-38): Floors, pipelines  
(interior), pipelines (exterior), boiler insulation, roofing  
materials

PIPE LINES (Reference AB)

Location of pipes: RM 129  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs,  
tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing,  
bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal  
conditions

Comments: ELBOW HARD CEMENTITIOUS MATERIAL. SEE FIGURE 37

PIPE LINES (Reference AF)

Location of pipes: RM 131  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs,  
tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder

11. Building G-38 (Echo Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HARD CEMENTITIOUS MATERIAL USED ON ELBOWS. SEE FIGURE 37

PIPE LINES (Reference AG)

Location of pipes: RM 115  
Pipe diameter with insulation (in.): 6.00  
Insulation thickness (in.): 2.000  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HARD CEMENTITIOUS ELBOW LAGGING. TOTAL OF 9 ELBOWS IN ROOM. SEE FIGURE 37

PIPE LINES (Reference AH)

Location of pipes: RM 115  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural

11. Building G-38 (Echo Site) (Cont'd)

Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HARD CEMENTITIOUS MATERIAL ON PIPING ELBOW. SEE FIGURE 37

PIPE LINES (Reference AI)  
Location of pipes: RM 115  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 1.000  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HARD CEMENTITIOUS MATERIAL ON PIPING ELBOW. TOTAL OF 7 ELBOWS IN ROOM. SEE FIGURE 37

PIPE LINES (Reference AJ)

Location of pipes: RM 115  
Pipe diameter with insulation (in.): 2.50  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural

11. Building G-38 (Echo Site) (Cont'd)

Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HARD CEMENTITIOUS MATERIAL ON PIPING ELBOW. TOTAL OF 4 ELBOWS IN ROOM. SEE FIGURE 37

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 678  
Thickness of material (in.): 0.125  
Estimated volume (CF): 7  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: LINOLEUM SHEETING. SEE FIGURE 37

BOILER INSULATION (Reference 25)

Location of asbestos-containing material: RM 129 (Interior)  
Friable or non-friable: Friable  
Area of insulation (SF): 1.29  
Thickness of material (in.): 2.75  
Estimated volume of asbestos (CF): 0.3  
Condition of material: Undisturbed  
Types of coatings present: Metal covering  
Building use near asbestos: Industrial maintenance  
Work population: None  
Ventilation: Natural

11. Building G-38 (Echo Site) (Cont'd)

Accessibility to area: Within normal reach  
Obstruction to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of renovation, repair, or damage  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: BOILER ROOM ACCESSED FROM OUTSIDE AND IS IN A TIGHT SPACE.  
SEE FIGURE 38

ROOF MATERIAL (Reference 11)

Asbestos-containing material found in: ROOFING  
Friable or non-friable: Non-friable  
Surface area (SF): 9,396  
Thickness of material (in.): 0.5  
Estimated volume (CF): 391.5  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Support  
Work population: None  
Ventilation: Natural  
Accessibility to area: > 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Normal vibrations from fans, closing doors, noise, etc.  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ROOF MATERIAL COVERING OF TAR ON CONCRETE. SEE FIGURE 38

ORIGINAL PAGE IS  
OF POOR QUALITY

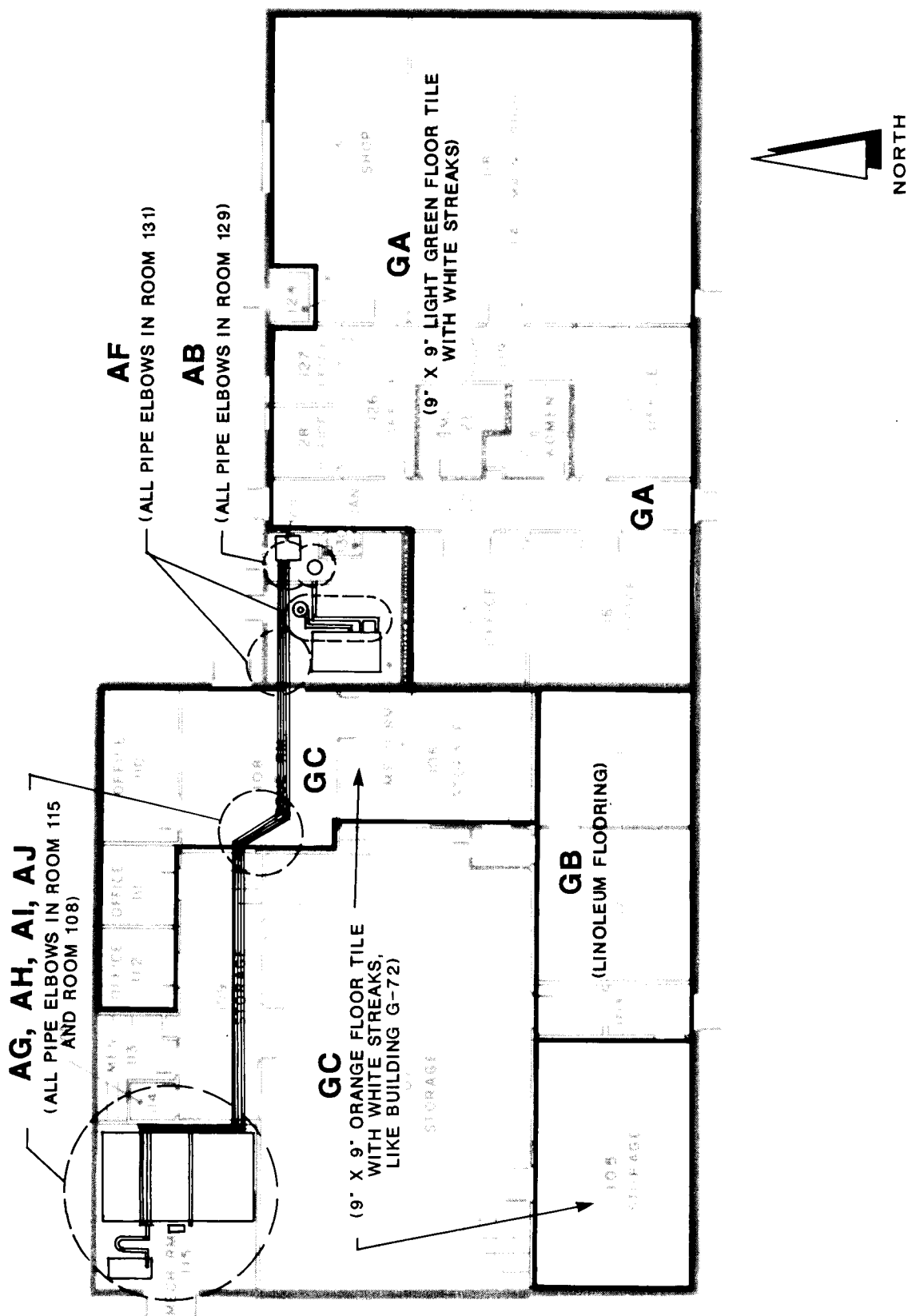


Figure 37. Echo Site: Network Laboratory and Maintenance Facility Building G-38.

PRECEDING PAGE BLANK NOT FILMED

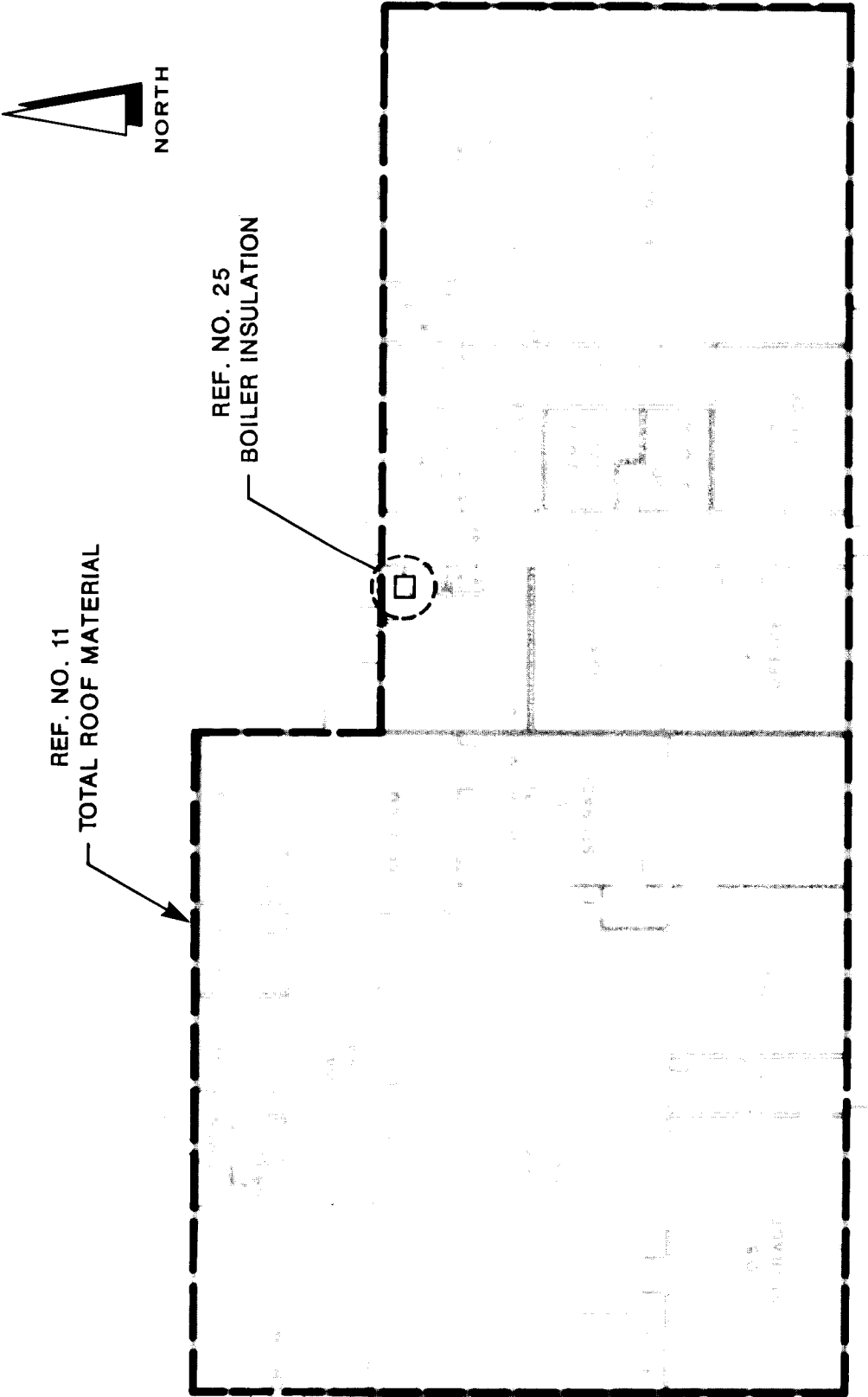


Figure 38. Echo Site: Network Laboratory and Maintenance Facility Building G-38.

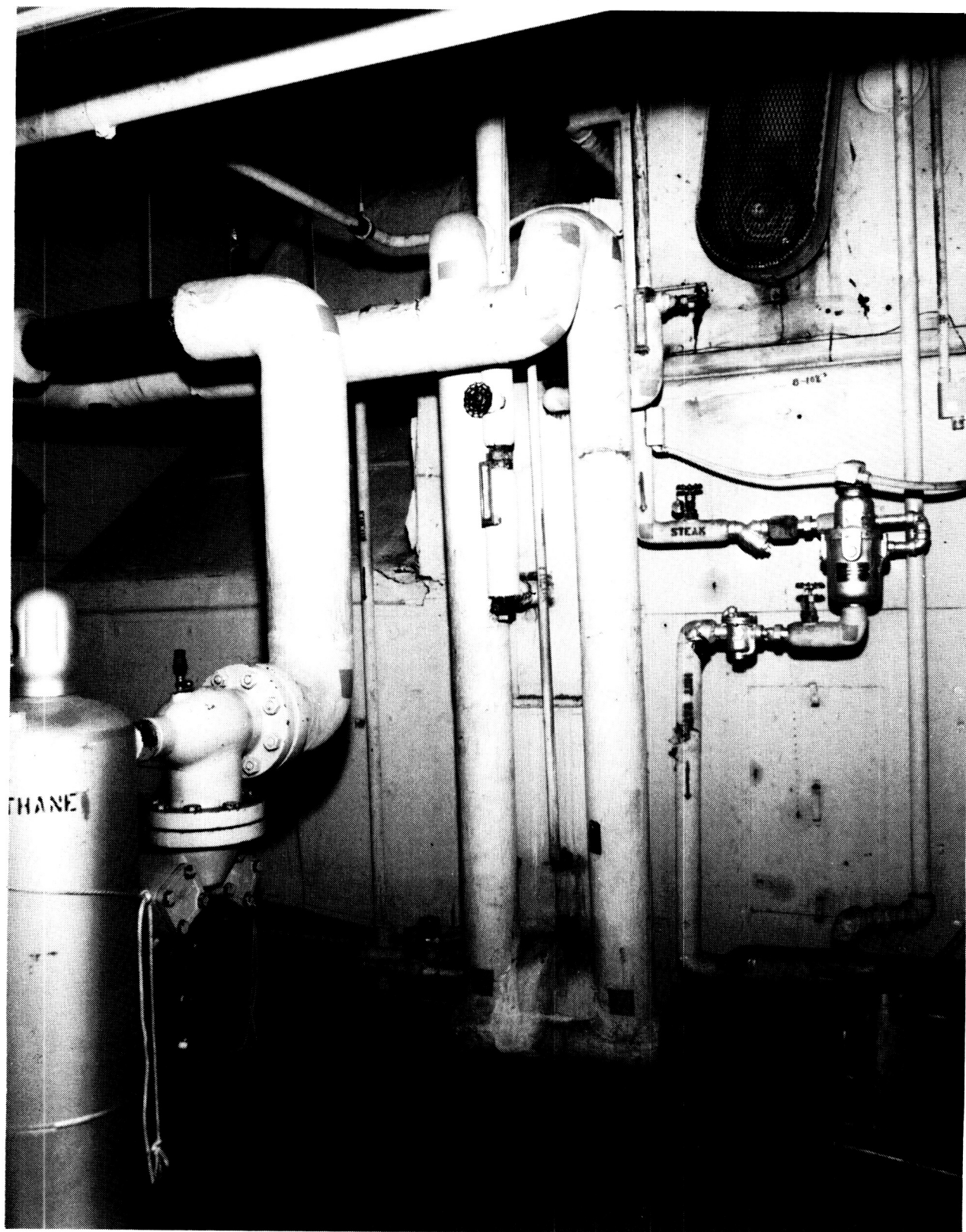


Figure 39. Echo Site: Building G-38, Mechanical Equipment Room 115, Asbestos-Containing Pipe Lagging.



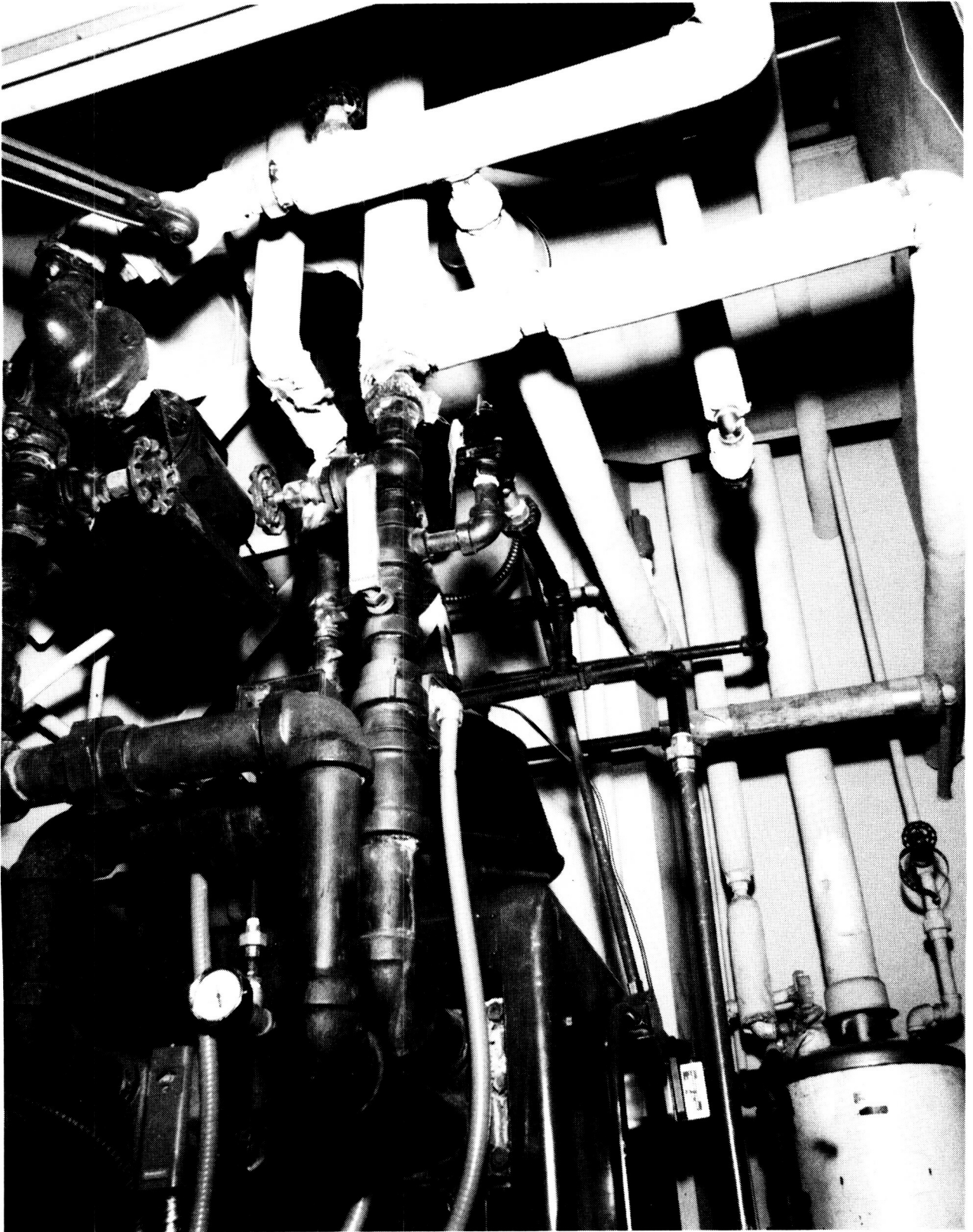


Figure 40. Echo Site: Building G-38, Boiler Room 129, Asbestos-Containing Pipe Lagging and Boiler Insulation.

ORIGINAL PAGE IS  
OF POOR QUALITY



Figure 41. Echo Site: Building G-38, Mechanical Equipment Room 131, Asbestos-Containing Pipe Lagging.

12. Building G-42 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,600/E 2,357,100  
Construction date: 1966  
Building type: Butler-type  
Number of floors: 1  
Total floor area (SF): 3264  
Building use: GARAGE BUILDING  
Summary of asbestos use (Bldg G-42): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 324  
Thickness of material (in.): 0.062  
Estimated volume (CF): 2  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. GREEN TILE WITH WHITE SPECKS. SEE FIGURE 42

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 153  
Thickness of material (in.): 0.062  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

12. Building G-42 (Echo Site) (Cont'd)

Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

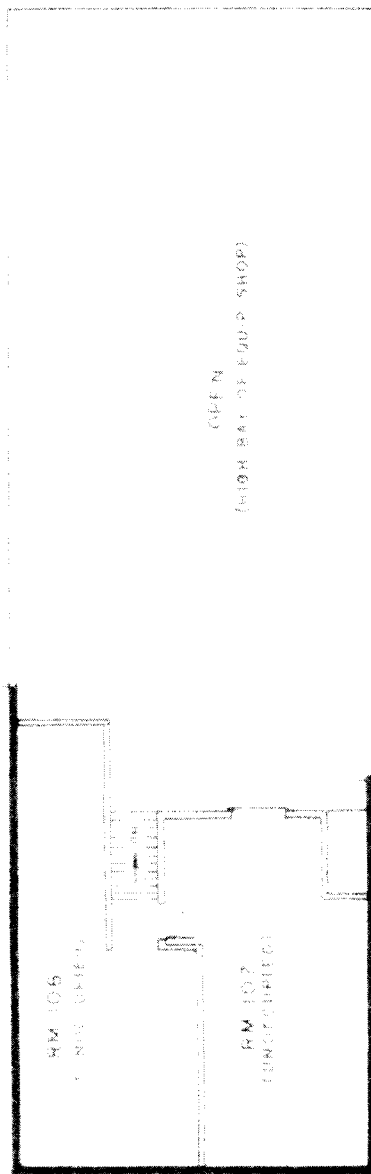
Comments: 9 X 9 in. WHITE TILE WITH GRAY AND BLACK MARBLE. SEE FIGURE 42

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 100  
Thickness of material (in.): 0.062  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH SPECKLES. SEE FIGURE 42

ORIGINAL PAGE IS  
OF POOR QUALITY



SECOND FLOOR

**GB**

(9" X 9" WHITE FLOOR TILE  
WITH GREY STREAKS)

**GC**

(9" X 9" WHITE FLOOR TILE  
WITH SPECKLES)

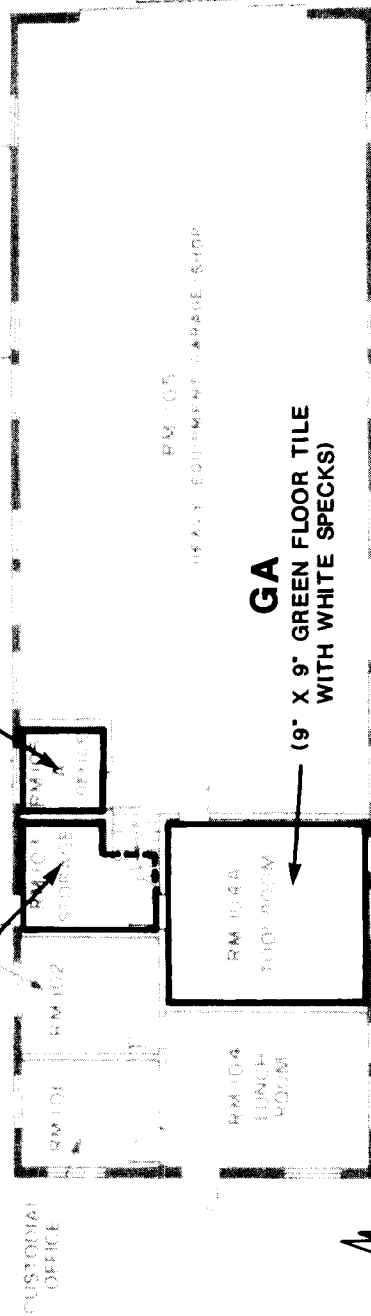


Figure 42. Echo Site: Garage Building G-42.

13. Building G-44 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,500/E2,357,300  
Construction date: 1970  
Building type: Frame  
Number of floors: 1  
Total floor area (SF): 204  
Building use: Flammable Storage Building  
Summary of asbestos use (Bldg G-44): Walls

WALLS STRUCTURE/PARTITIONS (Reference CA)

Asbestos-bearing material found in: Wall structure  
Friable or non-friable: Non-friable  
Surface area (SF): 812  
Thickness of material (in.): 0.375  
Estimated volume of asbestos (CF): 25  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present:  
Building Use near asbestos: Industrial warehouse  
Work population: None  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising., etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: EXTERIOR WALLS ARE TRANSITE AND PAINTED. INTERIOR WALLS EXTEND 4 FEET FROM FLOOR AND ARE TRANSITE. SEE FIGURE 43

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

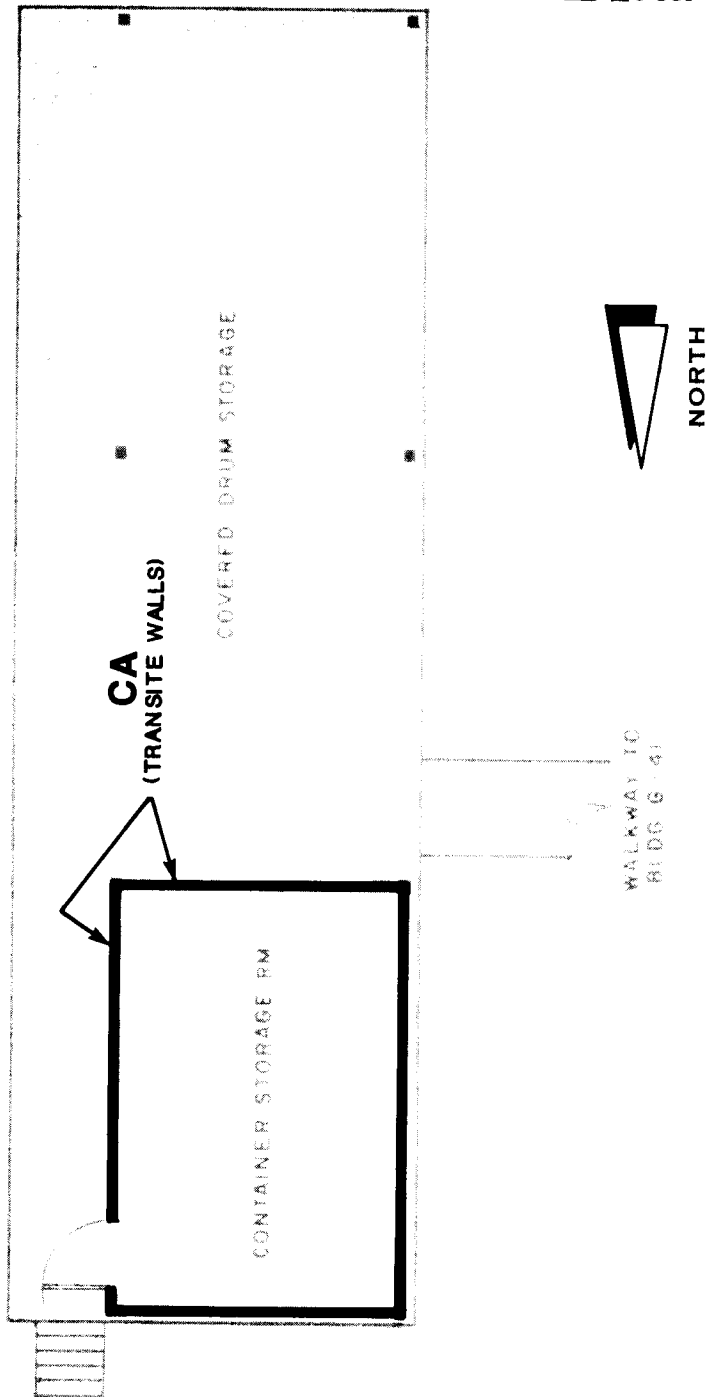


Figure 43. Echo Site: Flammable Drum Storage Building G-44.

REMARKS PAGE BLANK NOT FILLED

ORIGINAL PAGE IS  
OF POOR QUALITY



Figure 44. Echo Site: Building G-44, Flammable Drum Storage Shed Constructed with Asbestos-Containing Transite Wall Board.

RECORDING TAPE BLANK NOT FILMED



14. Building G-45 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 657,700/E 2,357,200  
Construction date: 1970  
Building type: Butler-type  
Number of floors: 1  
Total floor area (SF): 1056  
Building use: STORAGE BUILDING  
Summary of asbestos use (Bldg G-45): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 111  
Thickness of material (in.): 0.125  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Industrial warehouse  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BEIGE TILE WITH WHITE STREAKS. SEE FIGURE 45

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

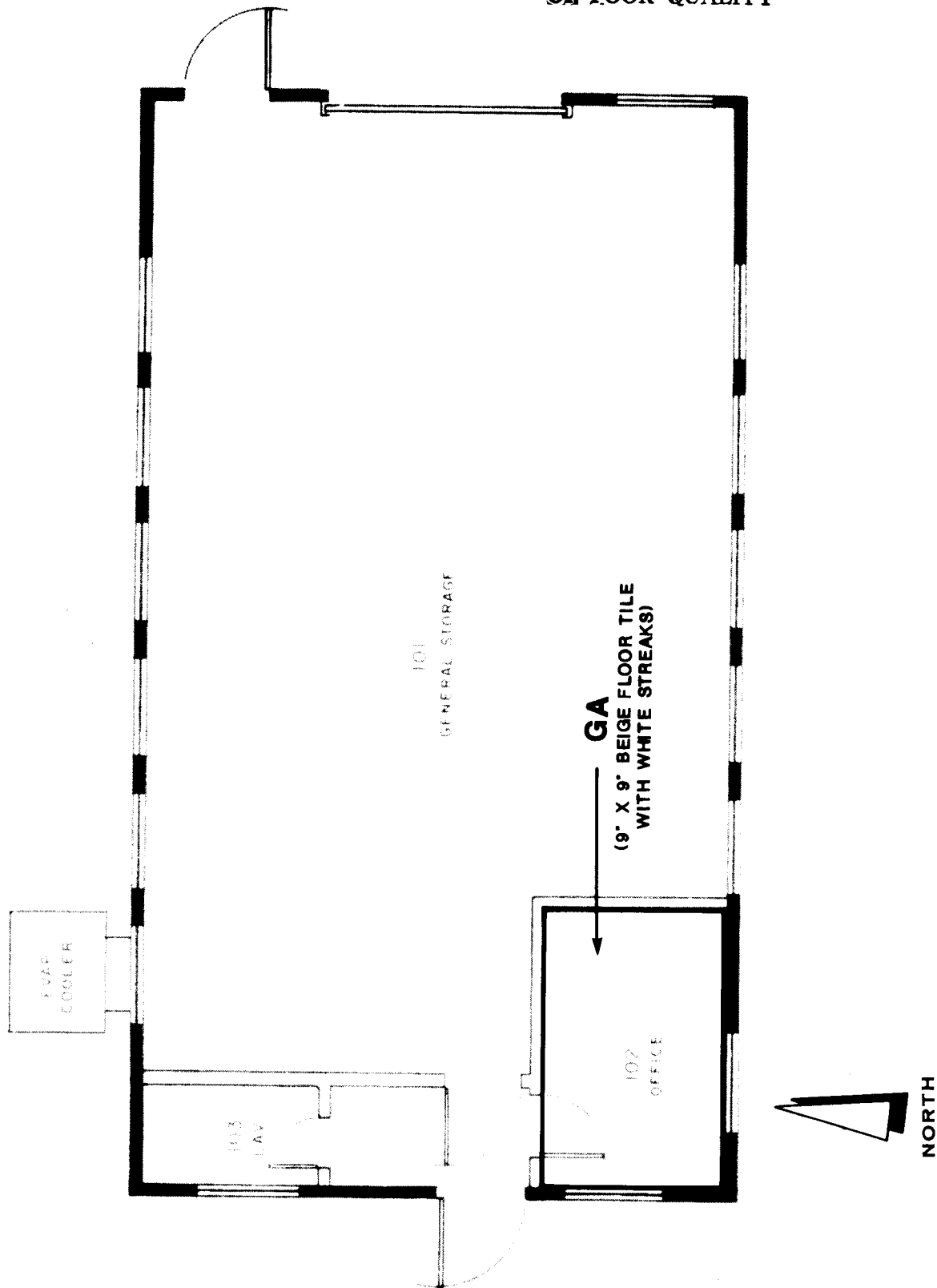


Figure 45. Echo Site: Storage Building G-45.

PRECEDING PAGE BLANK NOT FILMED

15. Building G-47 (Echo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 275,000/E 640,000  
Construction date: 1964  
Building type: Butler-type  
Number of floors: 1  
Total floor area (SF): 2000  
Building use: CARPENTER SHOP  
Summary of asbestos use (Bldg G-47): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 12 X 12 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1200  
Thickness of material (in.): 0.125  
Estimated volume (CF): 11  
Condition of material: Some physical damage (scuff, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 12 X 12 in. WHITE TILE WITH BROWN STREAKS. SEE FIGURE 46

PRECEDING PAGE BLANK NOT FILMED

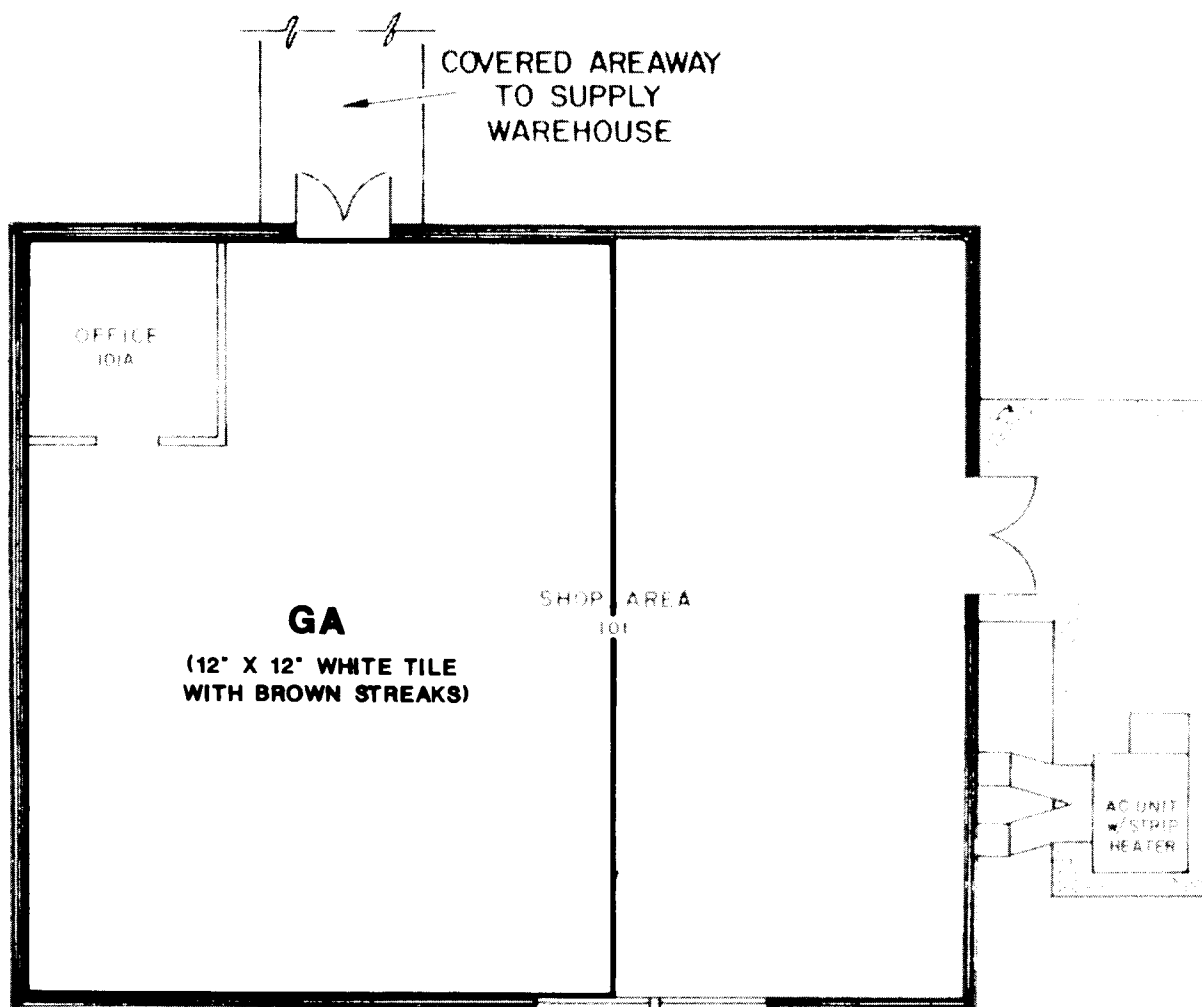
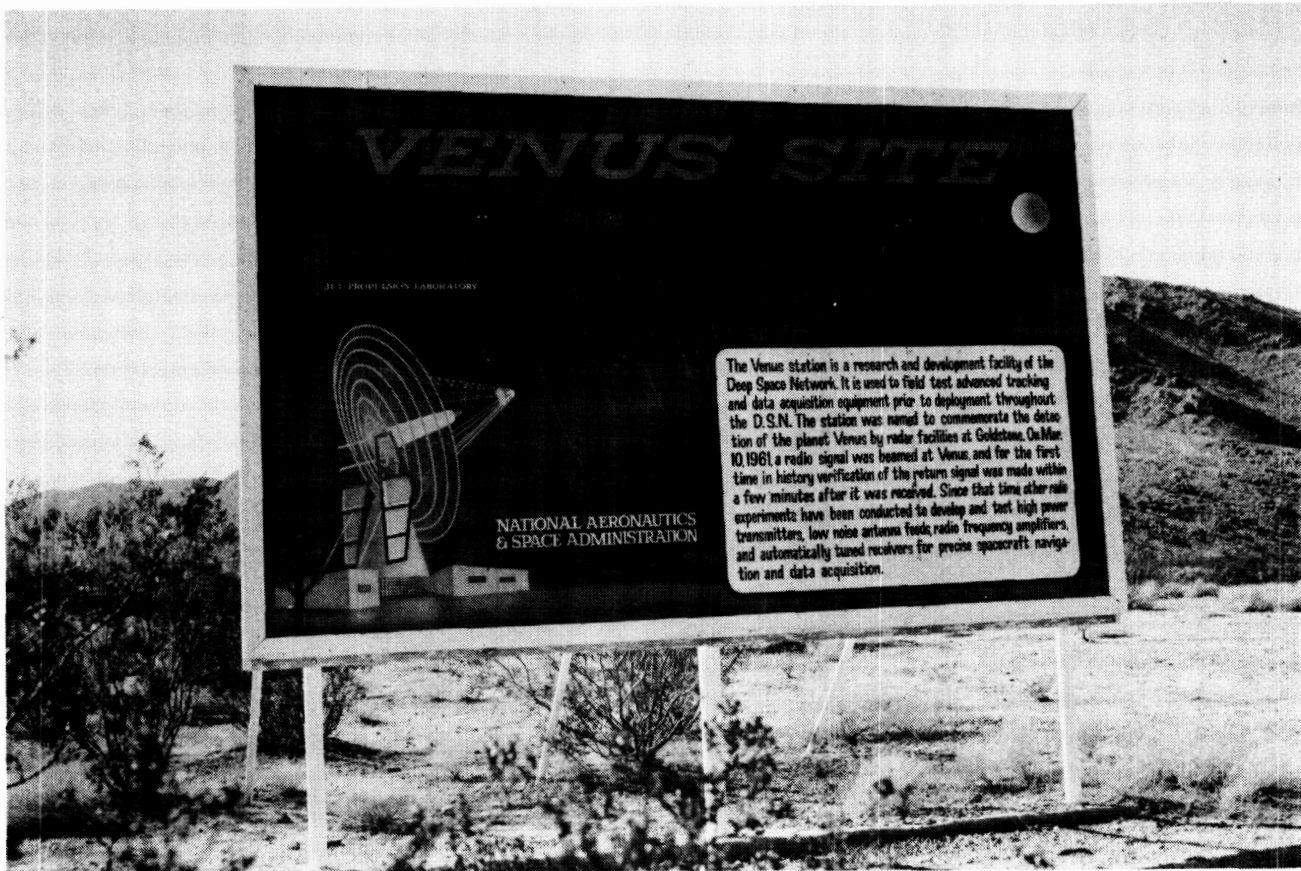


Figure 46. Echo Site: Carpenter Shop Building G-47.

PRECEDING PAGE BLANK NOT FILMED

VENUS STATION  
DSS 13

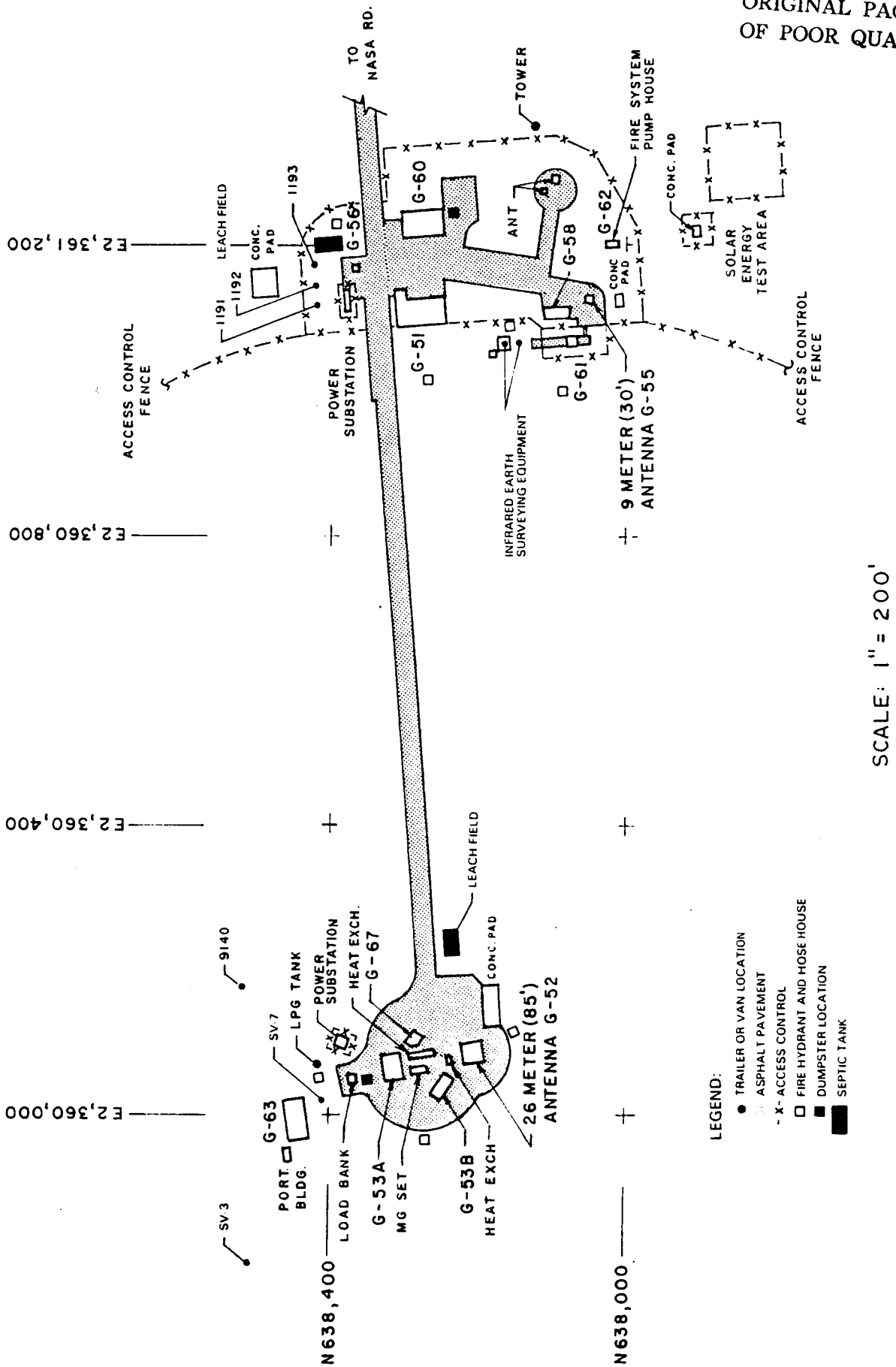
ORIGINAL PAGE IS  
OF POOR QUALITY



The 26-meter (85 ft) antenna at the Venus Station, originally was located at Echo Station, and was moved here in 1962. It first was used in a radar astronomy study of the planet Venus. New systems and equipment are thoroughly tested here for performance and reliability before they operationally are introduced into the DSN.

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY



16. Building G-51 (Venus Site)

GENERAL BUILDING INFORMATION

Map grid location: N 633,300/E2,361,100  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 2960  
Building use: VENUS CONTROL BUILDING  
Summary of asbestos use (Bldg G-51): Floors, walls, pipelines (interior)

PIPE LINES (Reference AB)

Location of pipes: RM 106  
Pipe diameter with insulation (in.): 5.00  
Insulation thickness (in.): 1.000  
Approximate pipe length (LF): 4.00  
Estimated insulation volume (CF): 2.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL WITH SOME ADDITIONAL USE EXTENDING AWAY FROM THE ELBOW. SEE FIGURE 48

PIPE LINES (Reference AD)

Location of pipes: RM 106  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 4.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Some delamination evident  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures

16. Building G-51 (Venus Site) (Cont'd)

Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL EXTENDED ON STRAIGHT PIPING TO EITHER SIDE OF ELBOW. SEE FIGURE 48

PIPE LINES (Reference AE)

Location of pipes: RM 107  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 1.000  
Approximate pipe length (LF): 1.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL. SEE FIGURE 48

PIPE LINES (Reference AF)

Location of pipes: RM 107  
Pipe diameter with insulation (in.): 6.00  
Insulation thickness (in.): 0.250  
Approximate pipe length (LF): 2.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)



16. Building G-51 (Venus Site) (Cont'd)

Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: EXHAUST FLUE INSULATION. SEE FIGURE 48

WALL STRUCTURES/PARTITIONS (Reference CA)

Asbestos-bearing material found in: Wall structure  
Friable or non-friable: Friable  
Surface area (SF): 1120  
Thickness of material (in.): 0.625  
Estimated volume of asbestos (CF): 58  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 1 X 1' PIN HOLE ACOUSTICAL TILE IN ROOM 101 ON THE WALLS. TILE HAS STANDARD COATING OF WHITE PAINT. SEE FIGURE 48

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1500  
Thickness of material (in.): 0.062  
Estimated volume (CF): 8  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes

16. Building G-51 (Venus Site) (Cont'd)

Suggested abatement timing: At time of demolition

Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: 9 in. X 2 ft. BEIGE TILE WITH SPECKS. ROOMS 102, 103, AND 105 CONTAIN 9 X 9 in. GREEN TILE WITH WHITE STREAKS LIKE FLOORING IN BUILDING G-56. SEE FIGURE 48

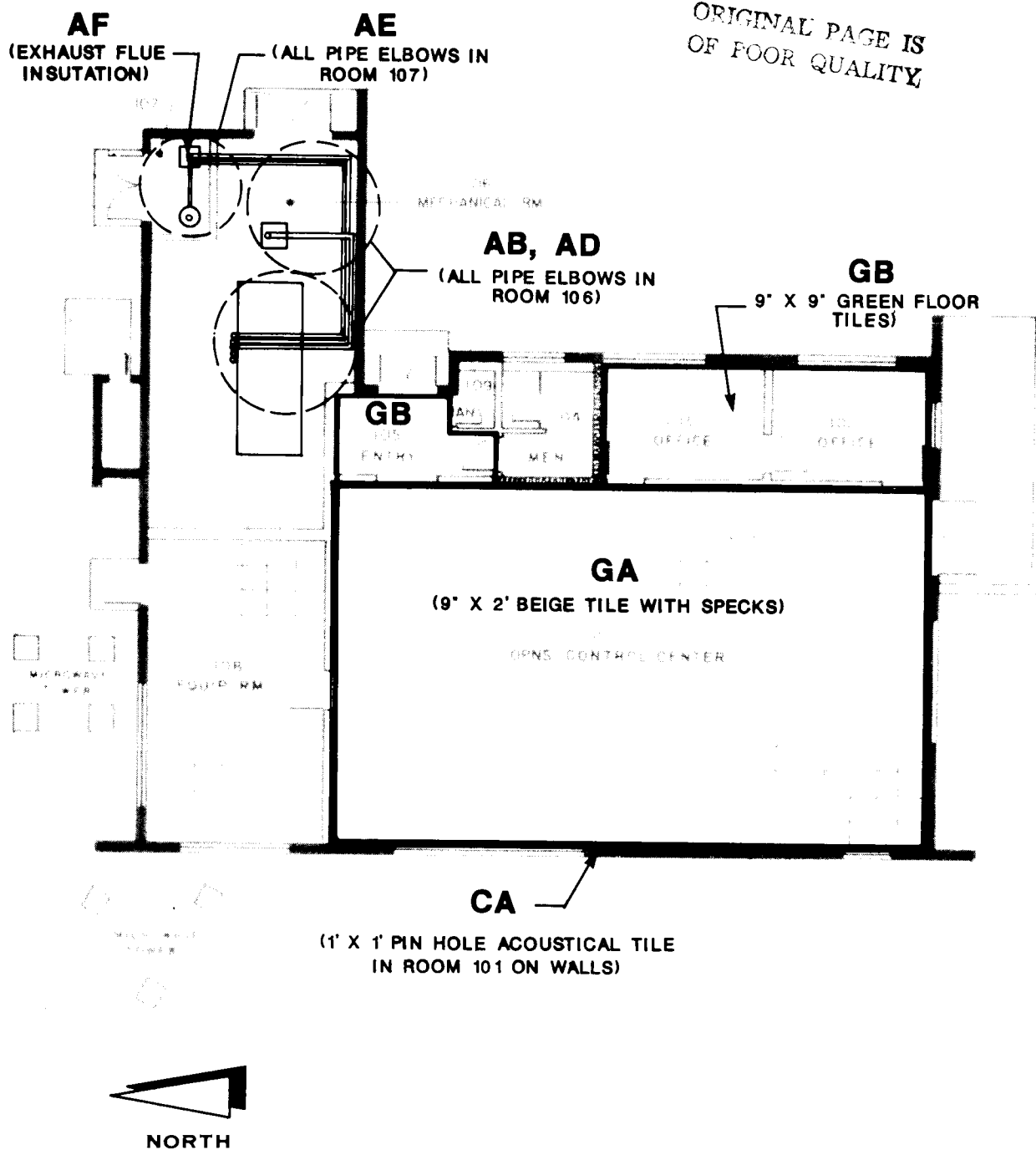


Figure 48. Venus Site: Control Building G-51.

ORIGINAL PAGE IS  
OF POOR QUALITY

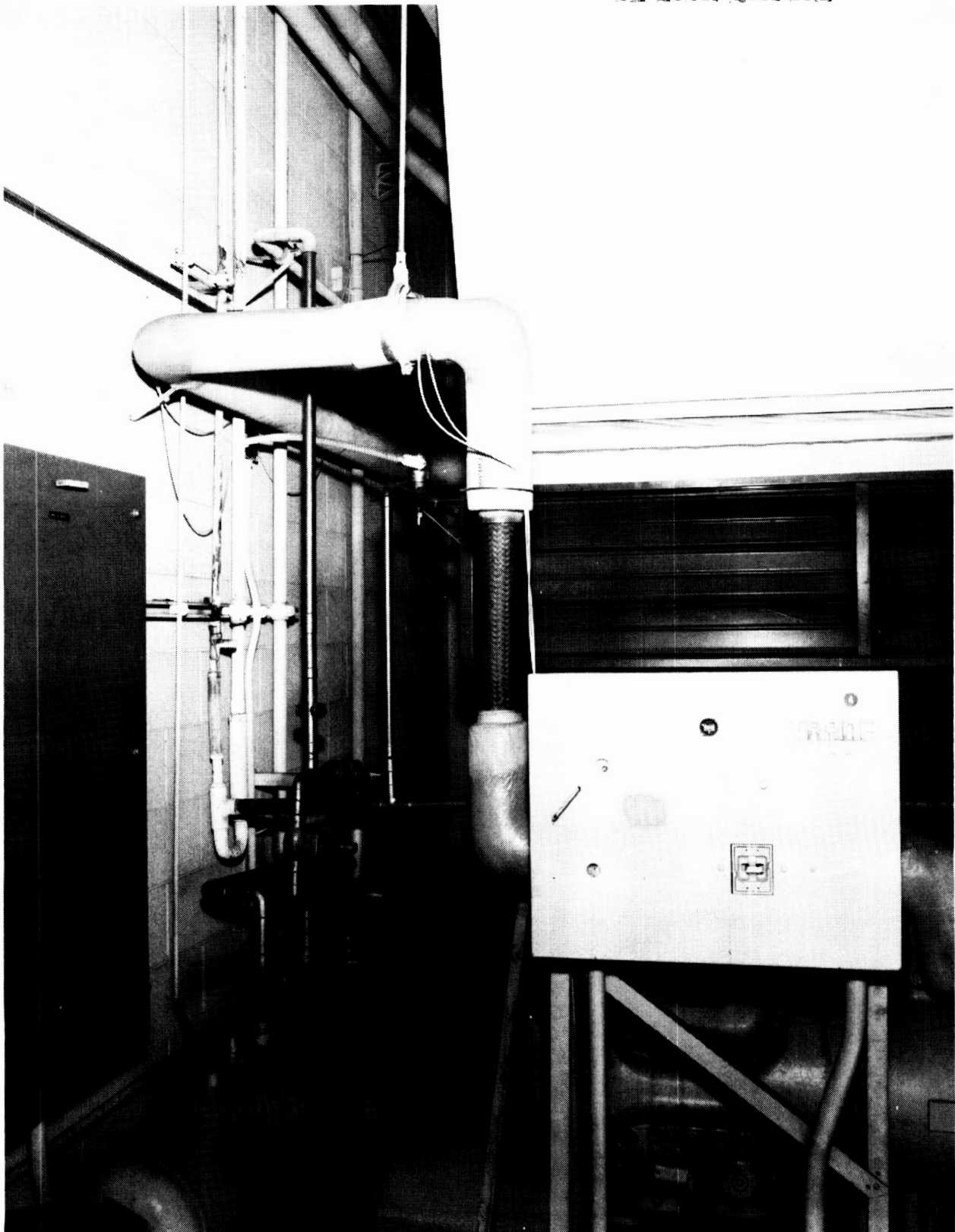


Figure 49. Venus Site: Building G-51, Mechanical Equipment Room 106,  
Asbestos-Containing Pipe Lagging.

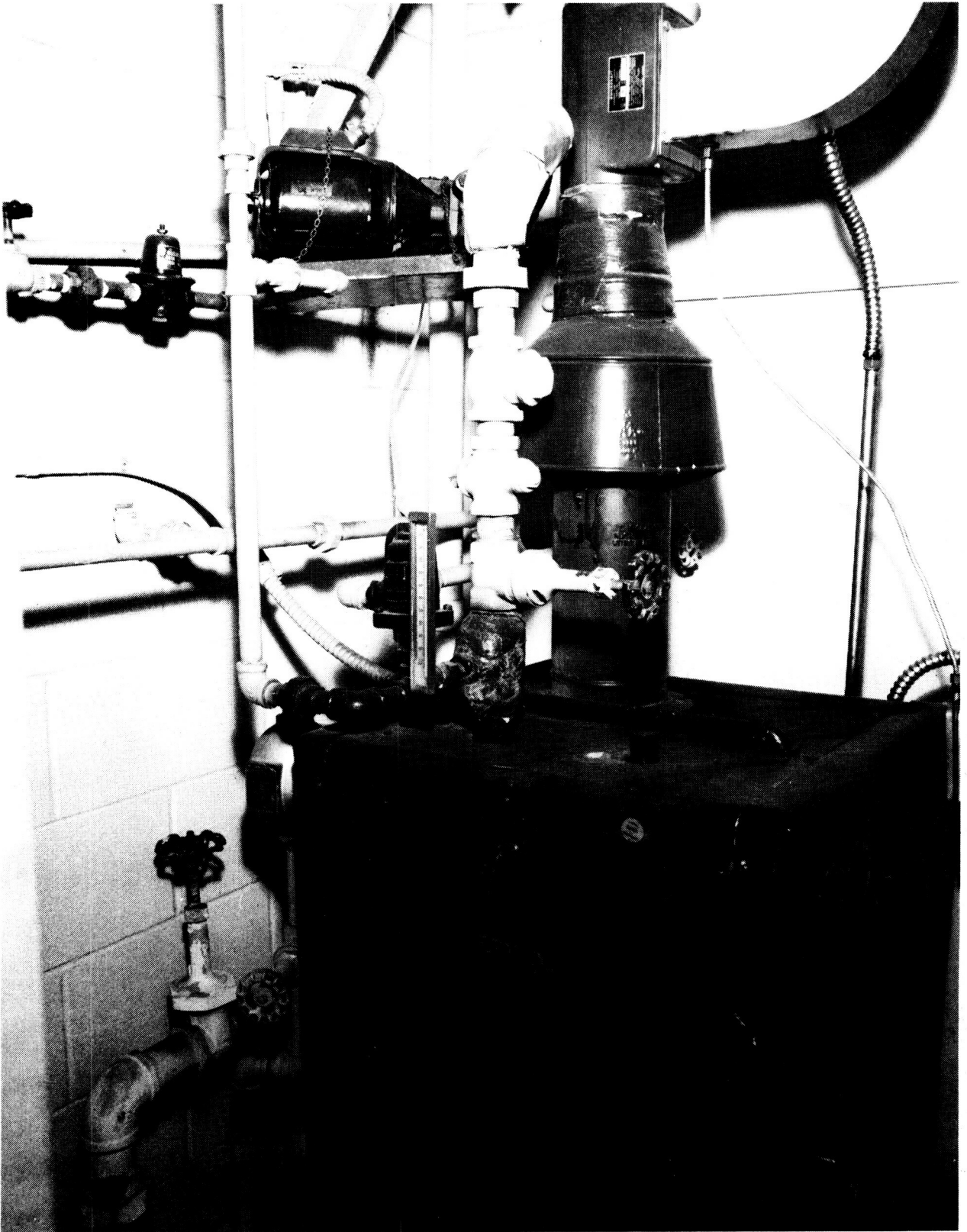


Figure 50. Venus Site: Building G-51, Boiler Room 107, Asbestos-Containing Pipe Lagging.

17. Building G-53A (Venus Site)

GENERAL BUILDING INFORMATION

Map grid location: N638,300/E2,360,100  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 2  
Total floor area (SF): 1912  
Building use: TRANSMITTER BUILDING  
Summary of asbestos use (Bldg G-53A): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 12 X 12 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 676  
Thickness of material (in.): 0.125  
Estimated volume (CF): 7  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 12 X 12 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURE 51

ORIGINAL PAGE IS  
OF POOR QUALITY

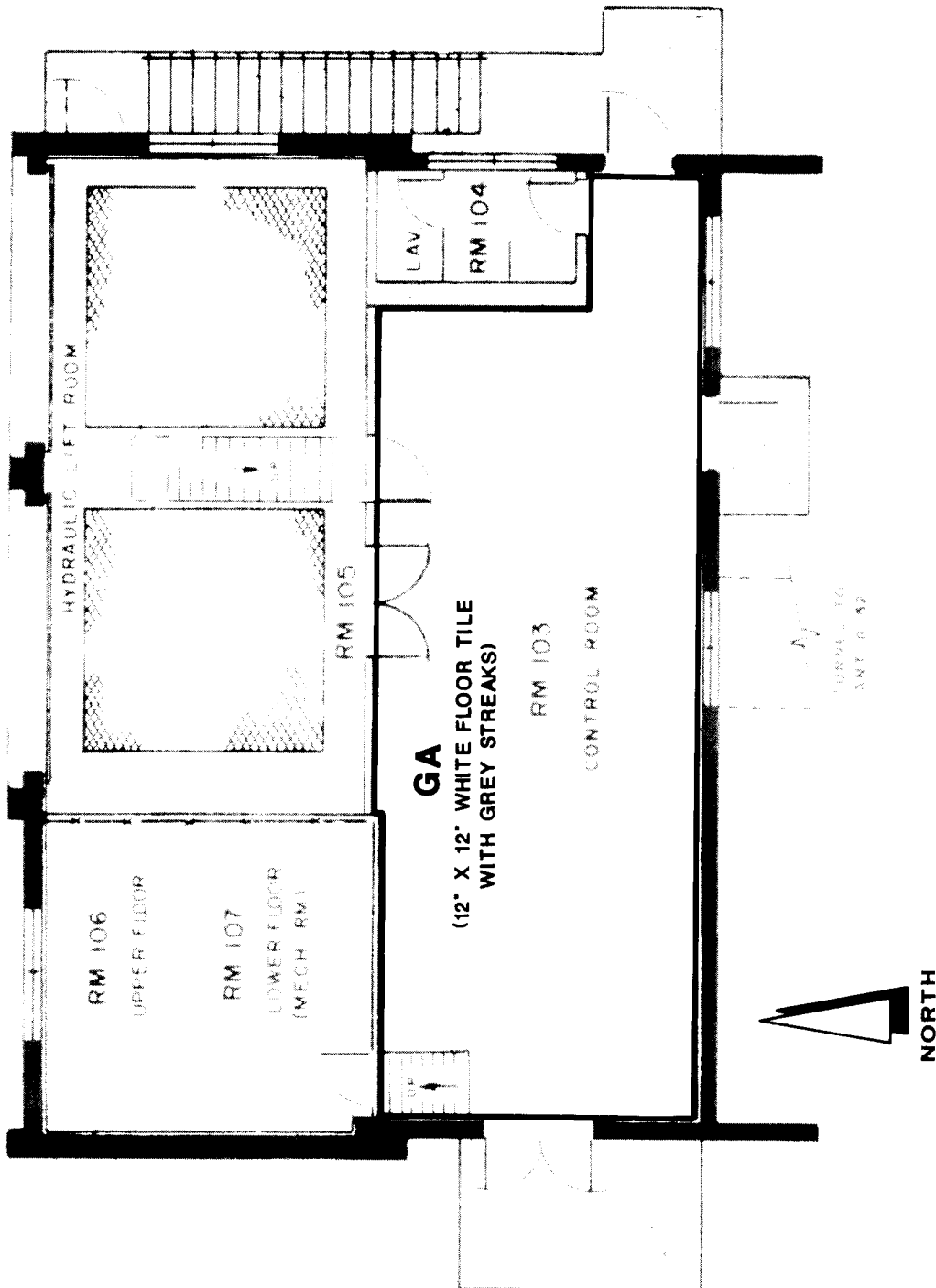


Figure 51. Venus Site: Transmitter Building G-53A.

PRECEDING PAGE BLANK NOT FILMED

18. Building G-56 (Venus Site)

GENERAL BUILDING INFORMATION

Map grid location: N638,400/E2,361,200  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 100  
Building use: SECURITY  
Summary of asbestos use (Bldg G-56): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 100  
Thickness of material (in.): 0.250  
Estimated volume (CF): 2  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Unoccupied at present  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. GREEN TILE. SEE FIGURE 52

PRECEDING PAGE BLANK NOT FILMED



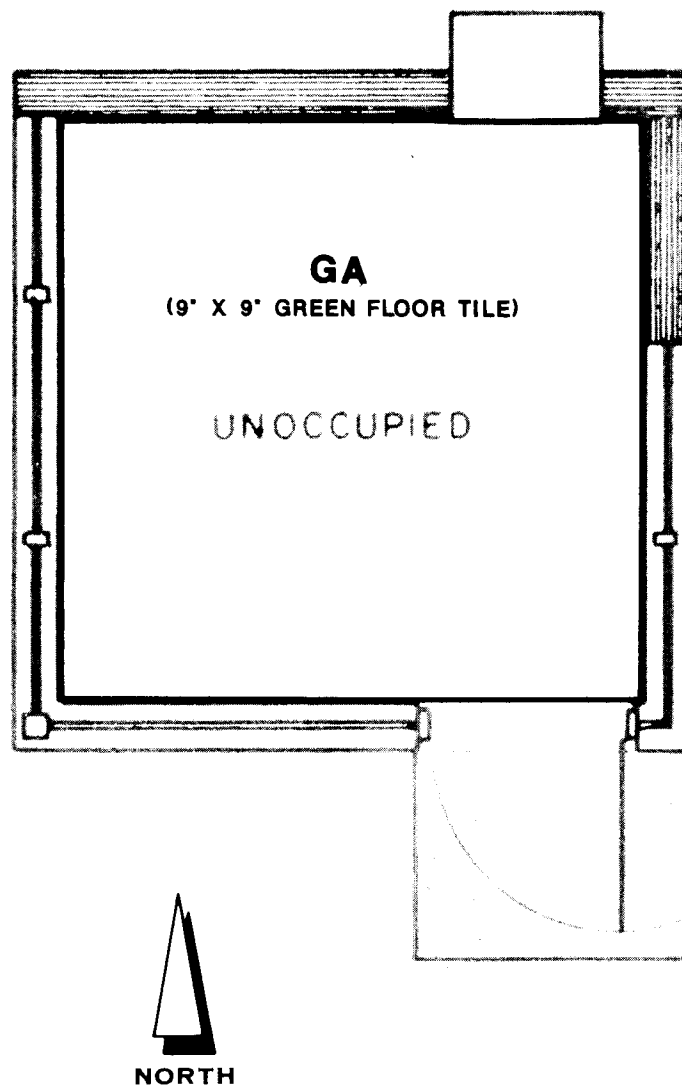


Figure 52. Venus Site: Security Building G-56.

PRECEDING PAGE BLANK NOT FILMED

19. Building G-58 (Venus Site)

GENERAL BUILDING INFORMATION

Map grid location: N 638,000/E 2,361,100  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 960  
Building use: 9 METER HYDRO-MECHANICAL/TRANSMITTER BUILDING  
Summary of asbestos use (Bldg G-58): Pipe lines (exterior)

PIPE LINES (Reference AA)

Location of pipes: EAST SIDE OF BUILDING  
Pipe diameter with insulation (in.): 12  
Insulation thickness (in.): 1.5  
Approximate pipe length (LF): 1.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: None  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL. SEE FIGURE 53

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

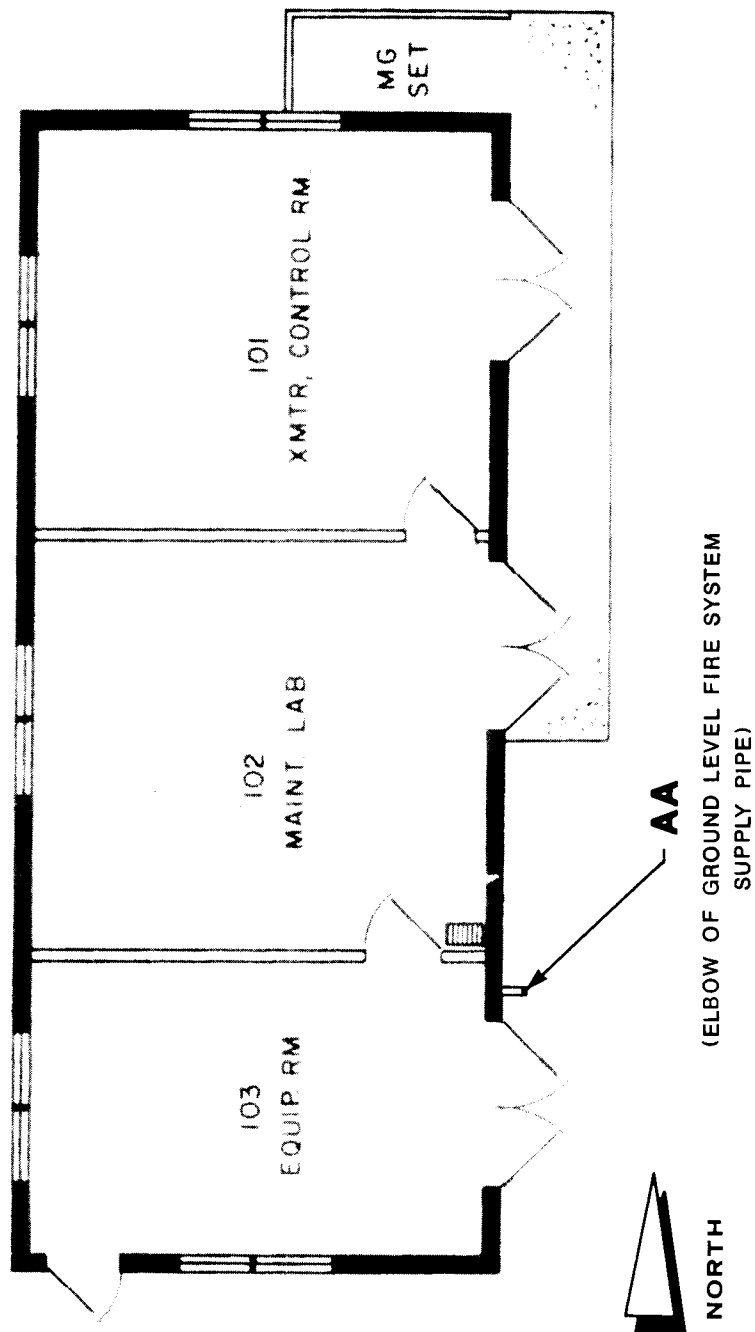


Figure 53. Venus Site: 30' Hydro-Mech and Transmitter Building G-58.

PRECEDING PAGE BLANK NOT FILMED

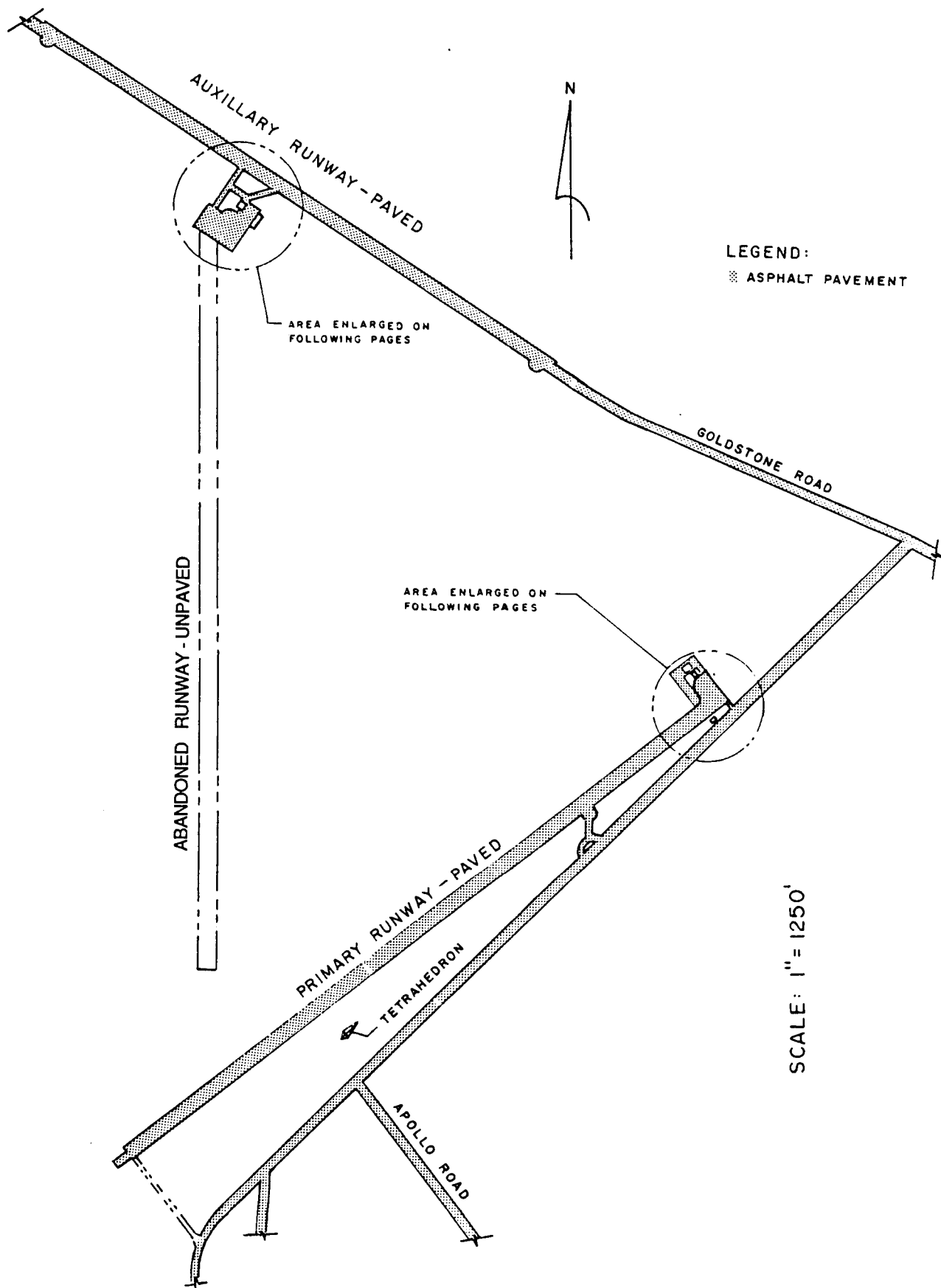


Figure 54. Goldstone Dry Lake Airport Plot Plan.

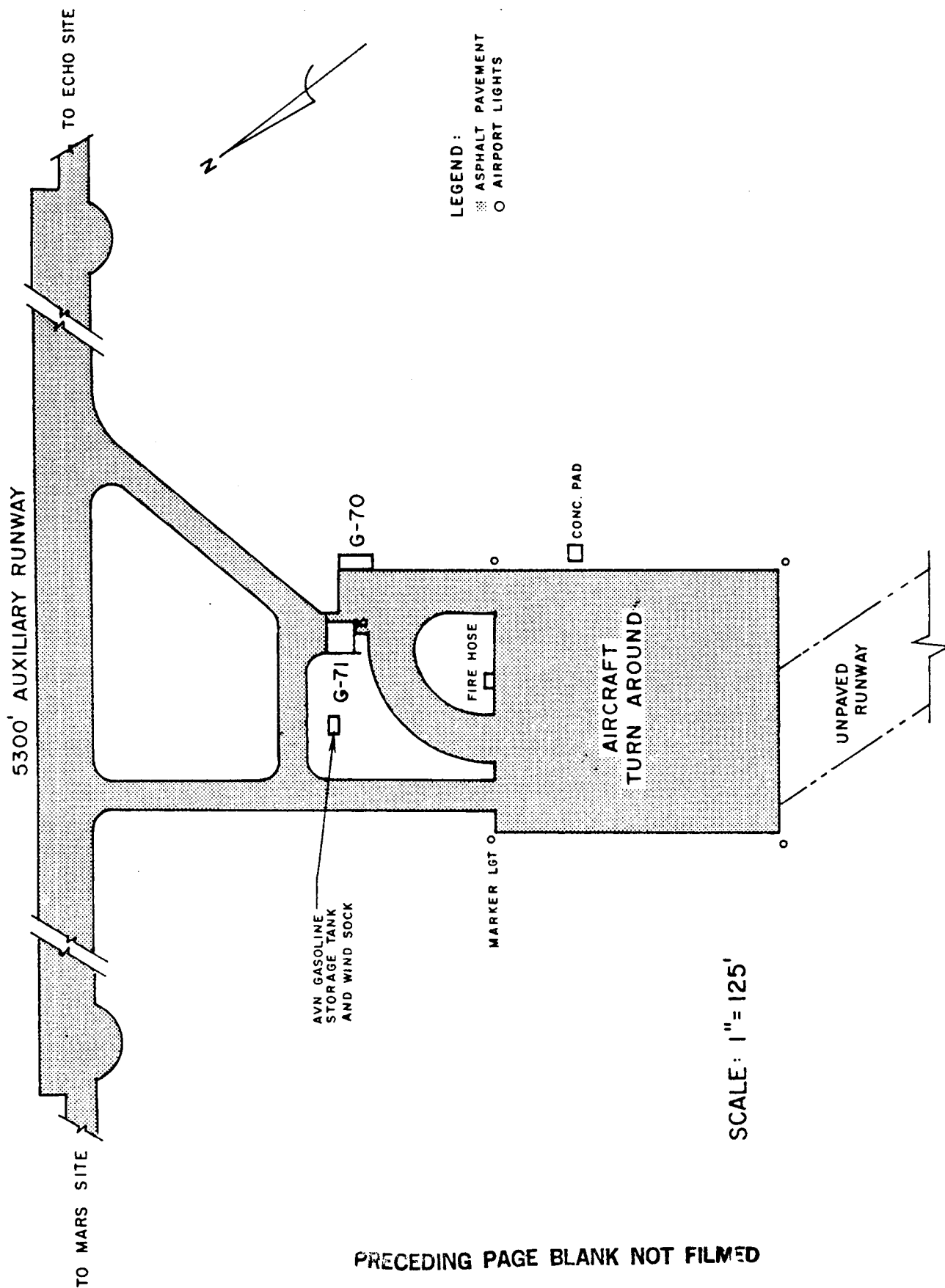


Figure 55. Goldstone Dry Lake Airport Terminal Area.

20. Building G-70 (Goldstone Dry Lake Airport)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: 1973  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 360  
Building use: BATTERY AND PORTABLE GENERATOR BUILDING  
Summary of asbestos use (Bldg G-70): Roofing

EXTERIOR SIDING/ROOF MATERIAL (Reference BA)

Asbestos-bearing material found in: Roofing  
Friable or non-friable: Non-friable  
Surface area (SF): 360  
Thickness of material (in.): 0.047  
Estimated volume (CF): 2  
Condition of material: Undisturbed  
Types of coatings present: Coatings/encapsulants  
Buildings use near asbestos:  
Work population: None  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: None  
Physical disturbances: None  
Presence of sensitive equipment:  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: FIBROUS ROOF MATERIAL WITH TAR COATING. SEE FIGURE 56

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

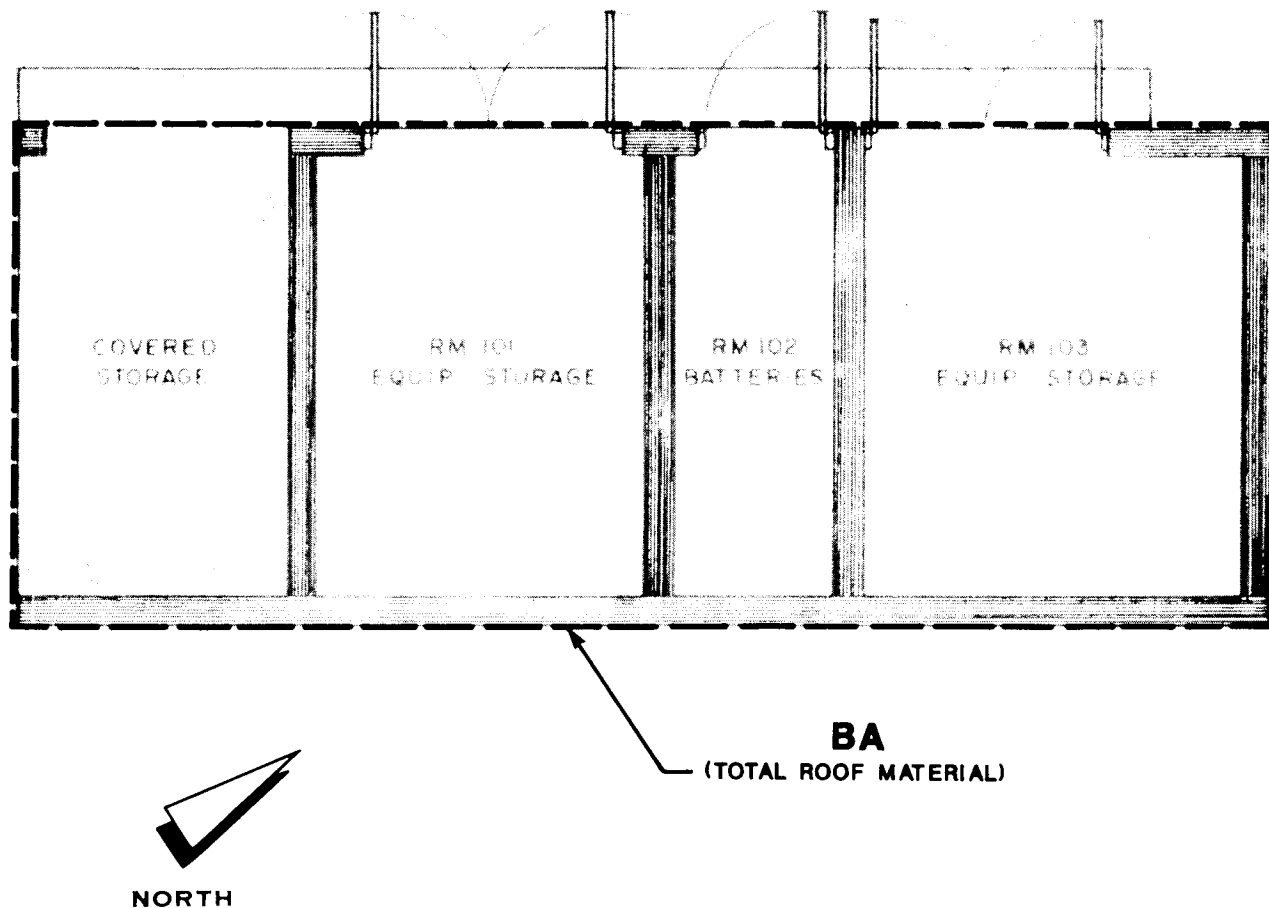


Figure 56. Goldstone Dry Lake Airport: Battery and Portable Generator Building G-70.

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

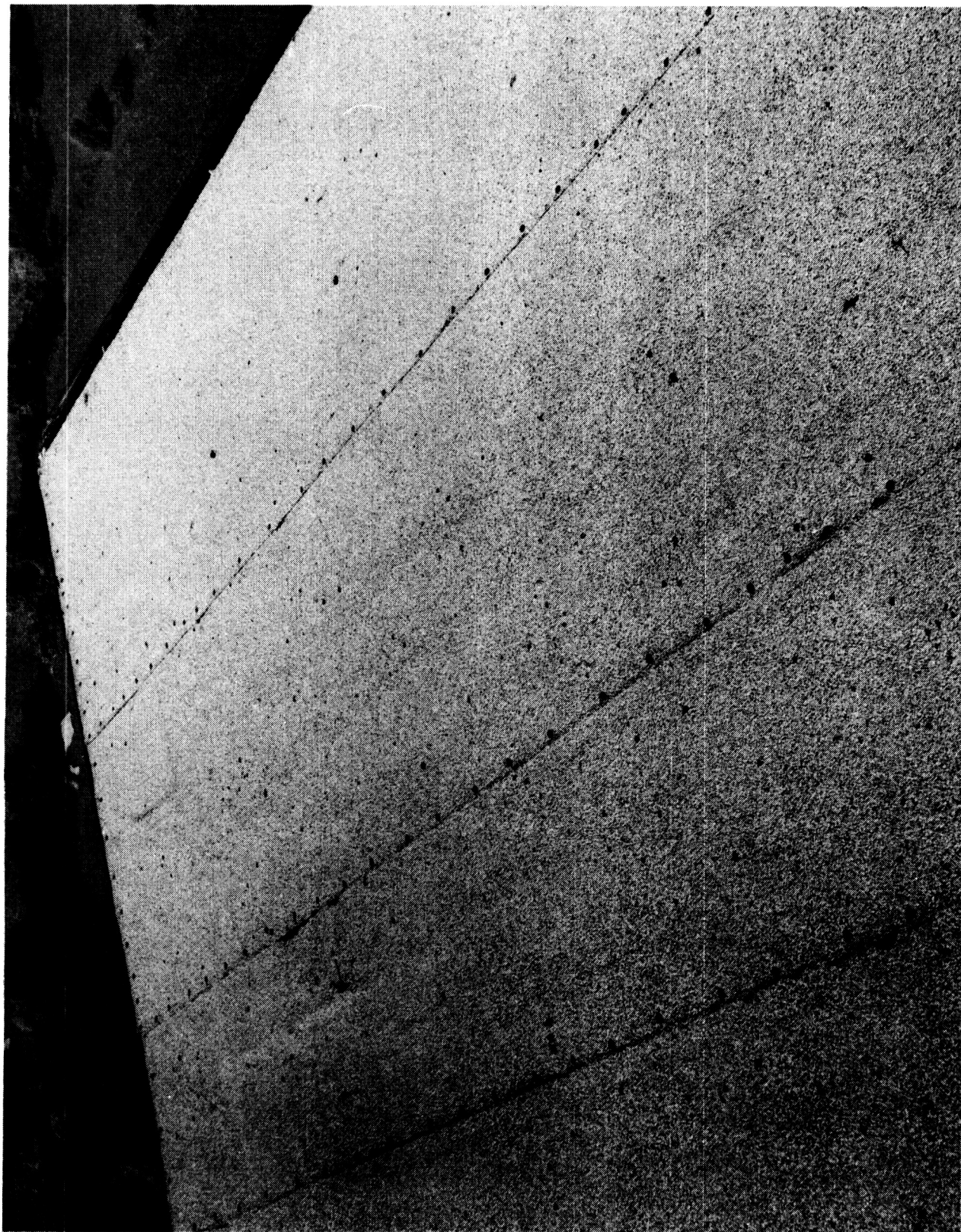


Figure 57. Goldstone Dry Lake Airport: Building G-70, Roof, Asbestos-Containing Roofing Material Typical of Asbestos Roofing Construction for Many Roofs at the GDSCC.



21. Building G-71 (Goldstone Dry Lake Airport)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 360  
Building use: AIRPORT FACILITIES BUILDING  
Summary of asbestos use (Bldg G-71): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 360  
Thickness of material (in.): 0.250  
Estimated volume (CF): 8  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial warehouse  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. GREEN TILE WITH WHITE STREAKS. SEE FIGURE 58

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

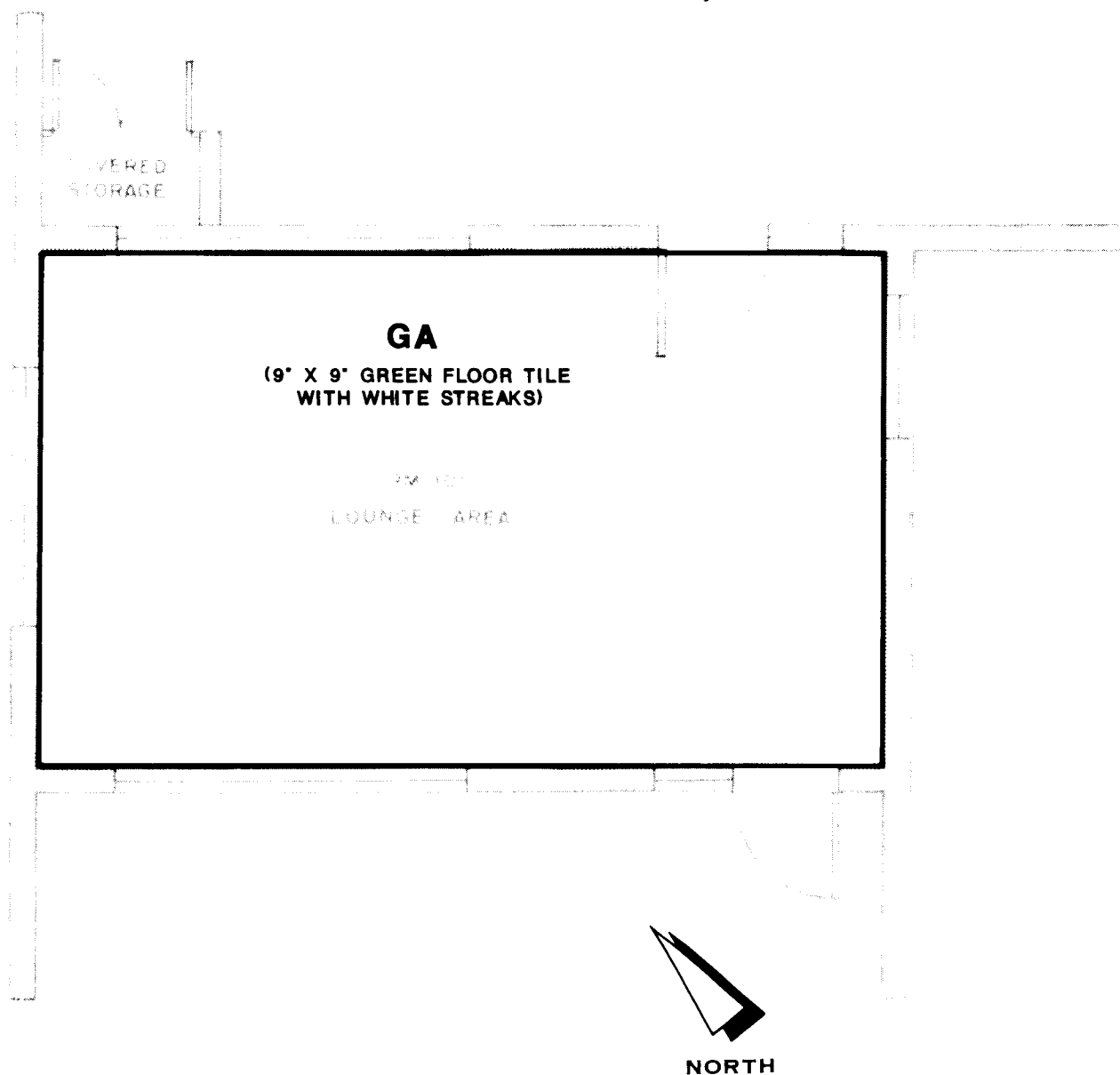
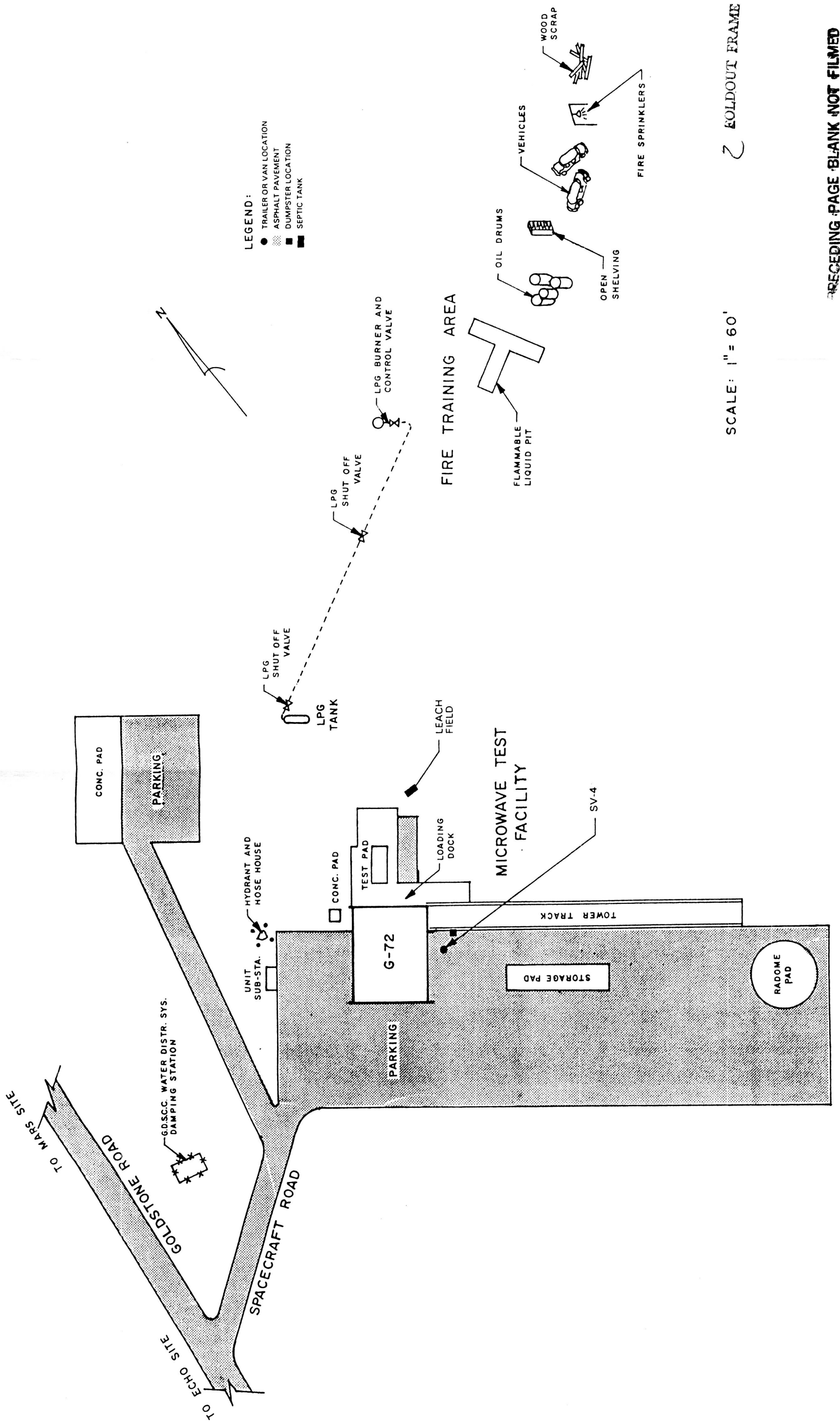


Figure 58. Goldstone Dry Lake Airport: Airport Facilities Building G-71.

PRECEDING PAGE BLANK NOT FILMED



FOLDOUT FRAME

Figure 59. Microwave Test Facility and Fire Training Area Plot Plan.

22. Building G-72 (Microwave Test Facility)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: 1958  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 2880  
Building use: MICROWAVE TEST FACILITY  
Summary of asbestos use (Bldg G-72): Floors, pipelines (interior), boiler insulation, roofing materials

PIPE LINES (Reference AB)

Location of pipes: RM 110  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 5.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Coatings/encapsulants  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: None  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL; OTHER AREAS OF PIPING ALSO MADE OF SAME MATERIAL. SEE FIGURE 60

PIPE LINES (Reference AE)

Location of pipes: RM 110  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 1.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Coatings/encapsulants  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures

PRECEDING PAGE BLANK NOT FILMED

22. Building G-72 (Microwave Test Facility) (Cont'd)

Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL. SEE FIGURE 60

PIPE LINES (Reference AF)

Location of pipes: RM 110  
Pipe diameter with insulation (in.): 6.00  
Insulation thickness (in.): 0.250  
Approximate pipe length (LF): 5.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Coatings/encapsulants  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: HEATER EXHAUST VENT FLUE COVERING. SEE FIGURE 60

PIPE LINES (Reference AH)

Location of pipes: RM 111  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.500  
Approximate pipe length (LF): 5.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Coatings/encapsulants  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

22. Building G-72 (Microwave Test Facility) (Cont'd)

Presence of sensitive equipment: Yes  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL. SEE FIGURE 60

PIPE LINES (Reference AJ)

Location of pipes: RM 111  
Pipe diameter with insulation (in.): 5.00  
Insulation thickness (in.): 1.500  
Approximate pipe length (LF): 16.00  
Estimated insulation volume: (CF) 4.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Coatings/encapsulants  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW OF HARD CEMENTITIOUS MATERIAL. SEE FIGURE 60

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 400  
Thickness of material (in.): 0.250  
Estimated volume (CF): 8  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial warehouse  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

22. Building G-72 (Microwave Test Facility) (Cont'd)

Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. ORANGE TILE WITH WHITE STREAKS. SEE FIGURE 60

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1640  
Thickness of material (in.): 0.250  
Estimated volume (CF): 34  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial warehouse  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. LIGHT GREEN TILE WITH WHITE STREAKS. SEE FIGURE 60

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 11  
Thickness of material (in.): 0.250  
Estimated volume (CF): 1  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial warehouse  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

22. Building G-72 (Microwave Test Facility) (Cont'd)

Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. DARK GREEN TILE USED AS REPLACEMENT TILE.  
SEE FIGURE 60

FLOORING MATERIALS (Reference GD)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 340  
Thickness of material (in.): 0.250  
Estimated volume (CF): 7  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial warehouse  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BROWN TILE WITH MULTI-COLORED SPECKLES. SEE FIGURE 60

BOILER INSULATION (Reference 43)

Location of asbestos-containing material: RM 110 (Interior)  
Friable or non-friable: Friable  
Area of insulation (SF): 1.45  
Thickness of material (in.): 3.00  
Estimated volume of asbestos (CF): 0.4  
Condition of material: Undisturbed  
Types of coatings present: Metal covering  
Building use near asbestos: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)



22. Building G-72 (Microwave Test Facility) (Cont'd)

Presence of sensitive equipment: No  
Suggested abatement timing: At time of renovation, repair, or damage  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: BOILER ROOM ACCESSED FROM OUTSIDE AND IS IN A TIGHT SPACE.  
SEE FIGURE 61

ROOF MATERIAL (Reference 20)

Asbestos-containing material found in: ROOFING  
Friable or non-friable: Non-friable  
Surface area (SF): 2,880  
Thickness of material (in.): 4.50  
Estimated volume (CF): 1080  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Support  
Work population: None  
Ventilation: Natural  
Accessibility to area: > 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Normal vibrations from fans, closing doors, noise, etc.  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ROOF MATERIAL COVERED WITH TAR. SEE FIGURE 61

ORIGINAL PAGE IS  
OF POOR QUALITY

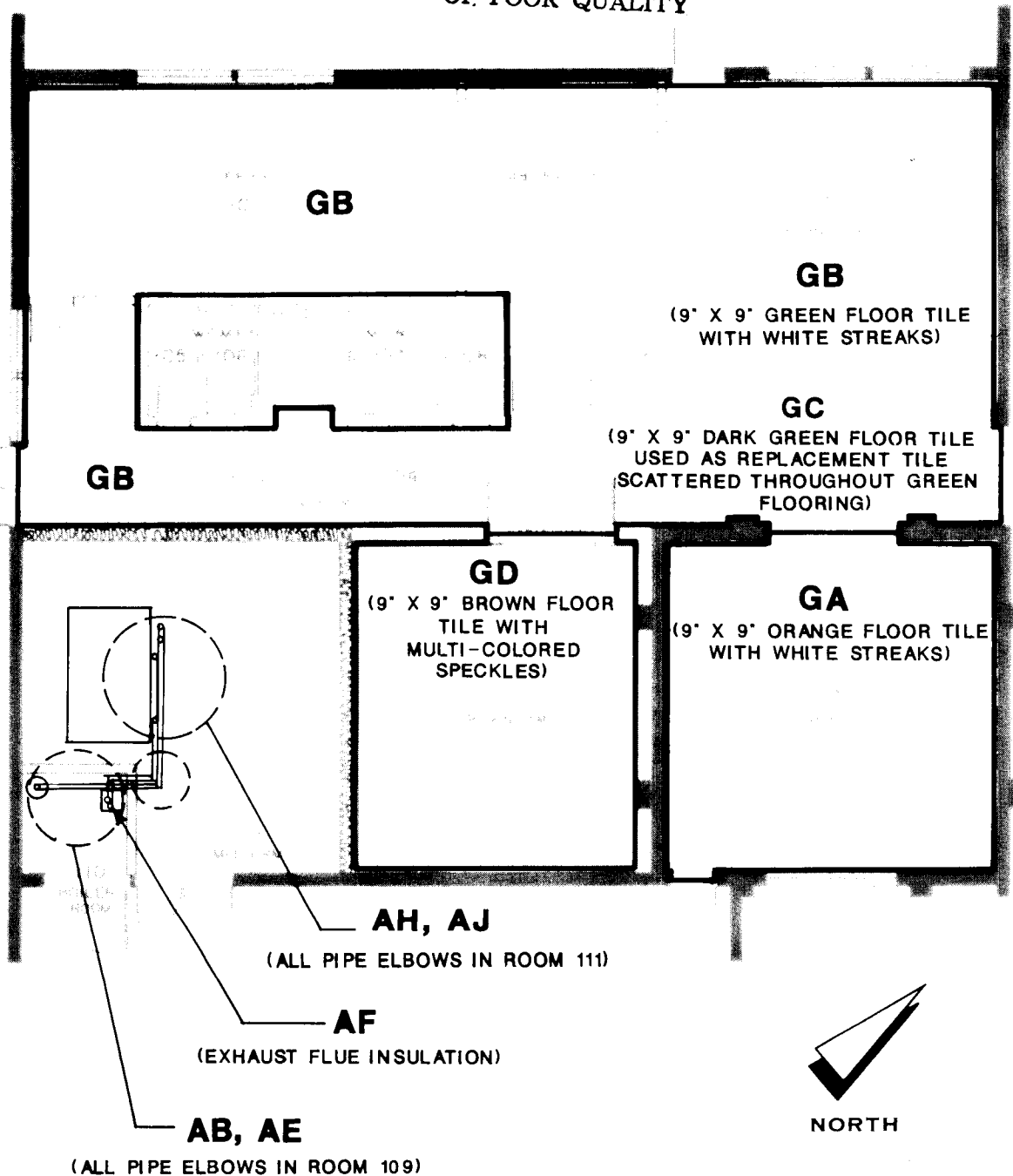


Figure 60. Microwave Test Facility: Microwave Test Facility Building G-72.

ORIGINAL PAGE IS  
OF POOR QUALITY

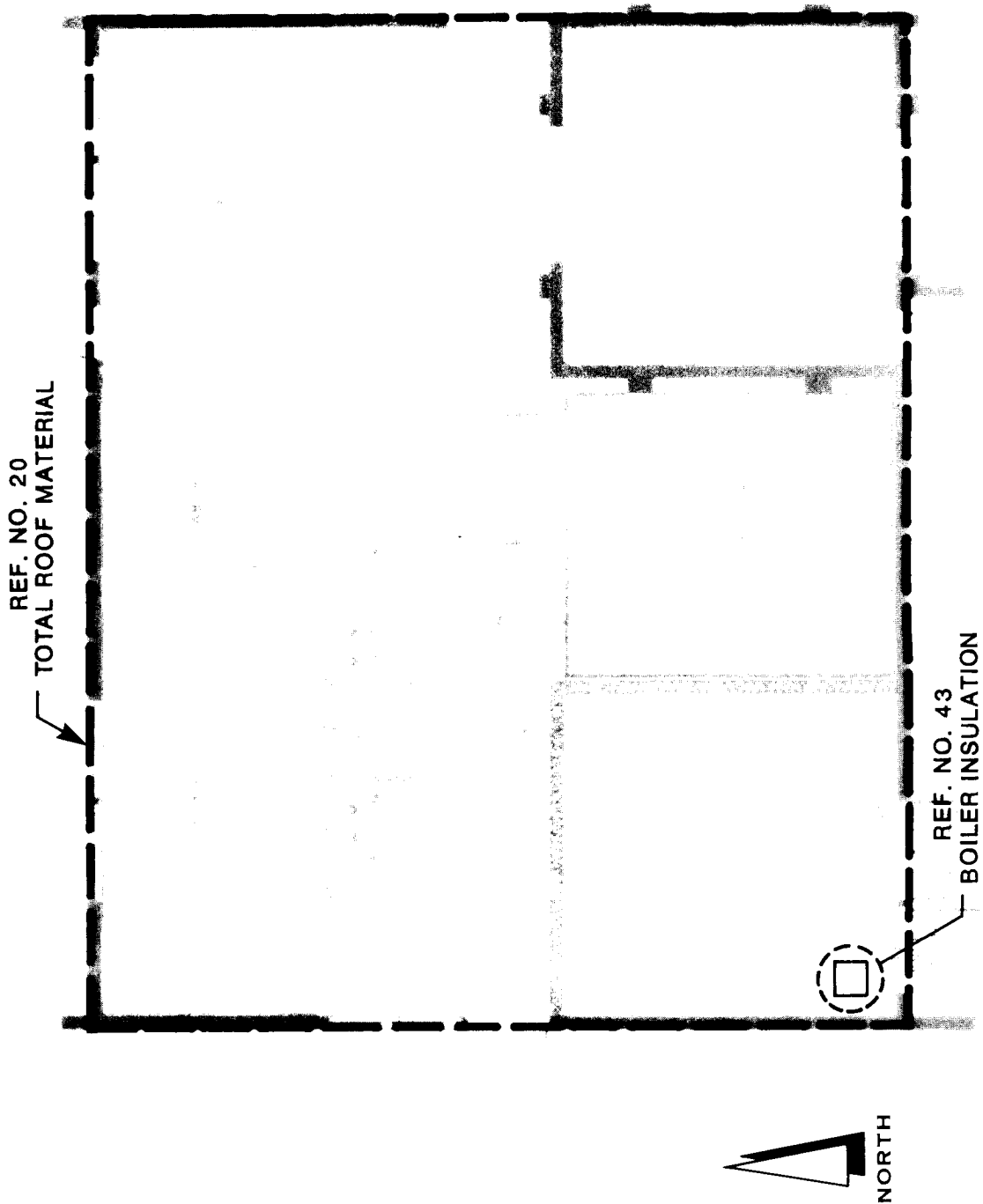


Figure 61. Microwave Test Facility: Microwave Test Facility Building G-72.

ORIGINAL PAGE IS  
OF POOR QUALITY

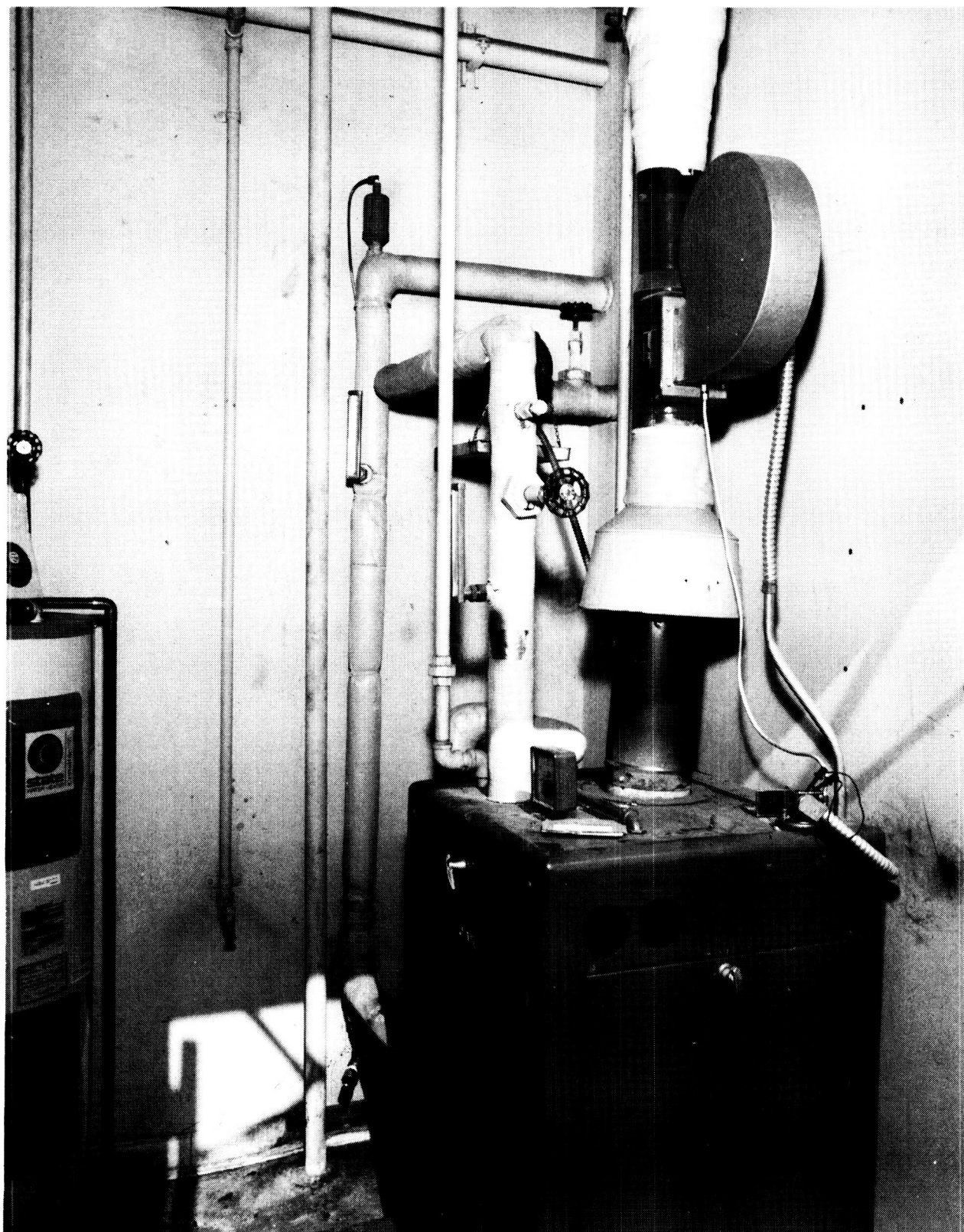


Figure 62. Microwave Test Facility: Building G-72, Boiler Room 110, Asbestos-Containing Pipe Lagging and Boiler Insulation.

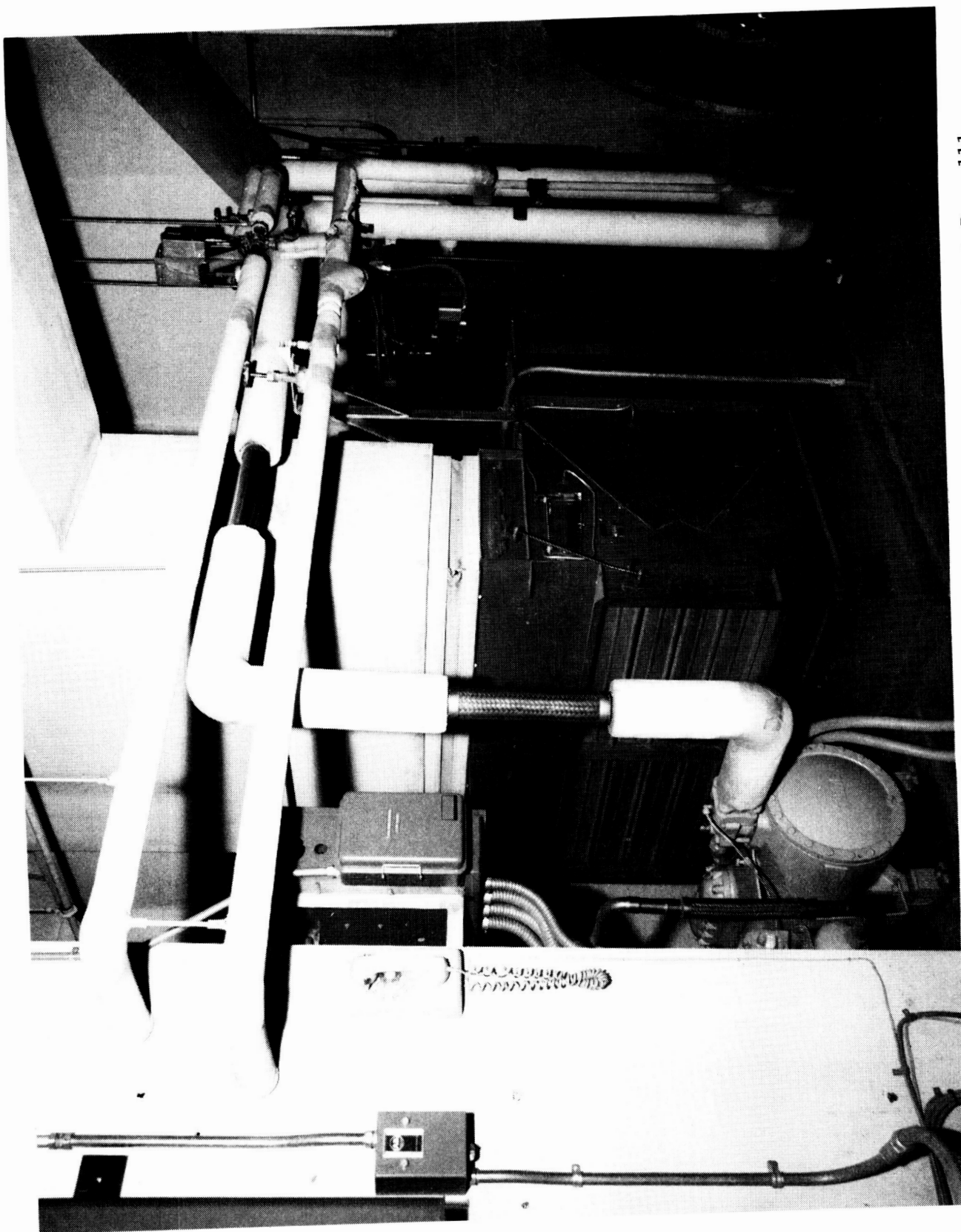
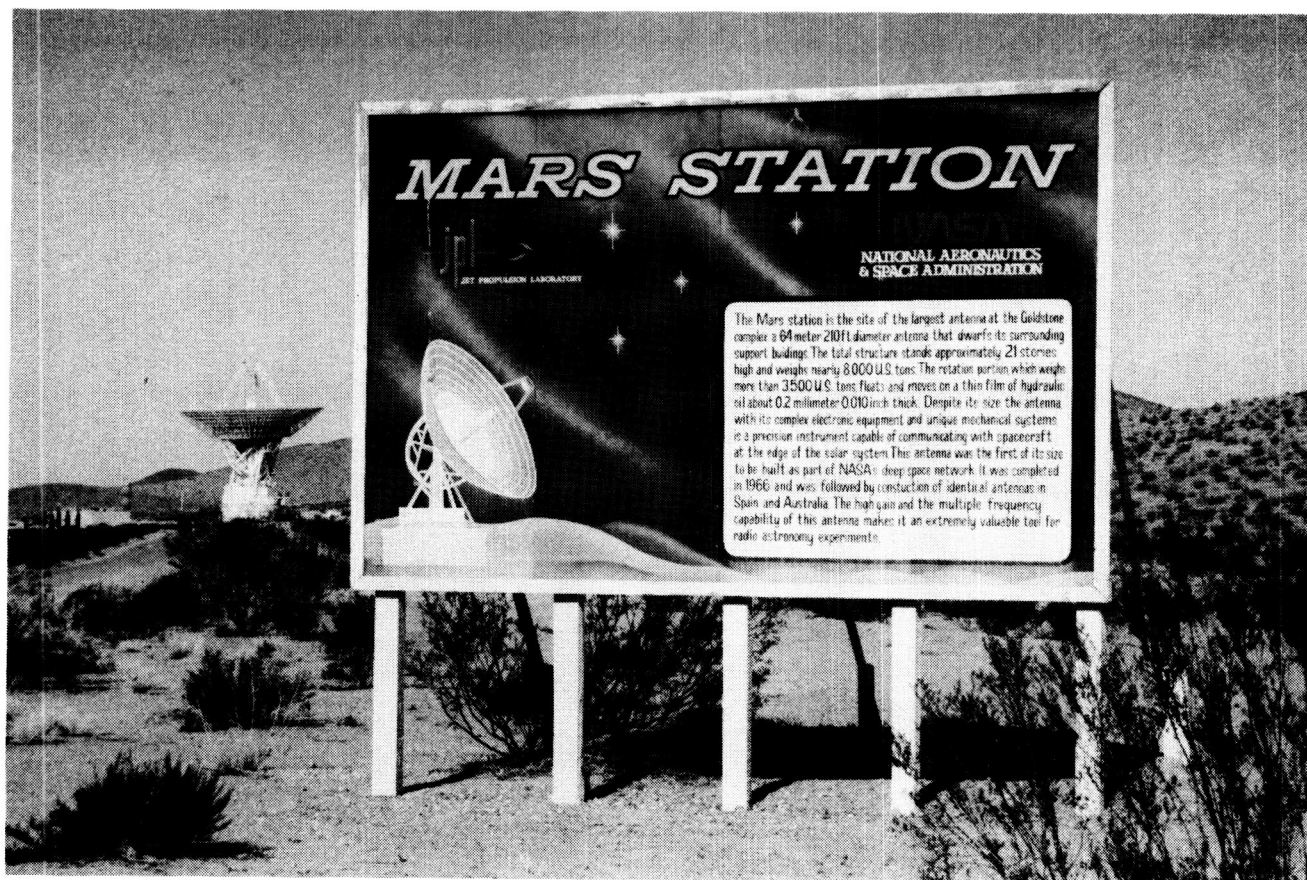


Figure 63. Microwave Test Facility: Building G-72, Mechanical Equipment Room 111, Asbestos-Containing Pipe Lagging.

## MARS STATION DSS 14

ORIGINAL PAGE IS  
OF POOR QUALITY



Built in 1966, the 64-meter (210 ft) antenna, standing more than 234 ft tall, permitted the DSN's transmitter power and receiver sensitivity to increase 6.5 times compared to that of a 26-meter antenna. It also extended the range of the DSN into deep space by 2.5 times. The 64-meter parabolic dish is to be extended to 70 meters (230 ft) in time to be ready for the Voyager 2 spacecrafts encounter with the planet Neptune in 1989.

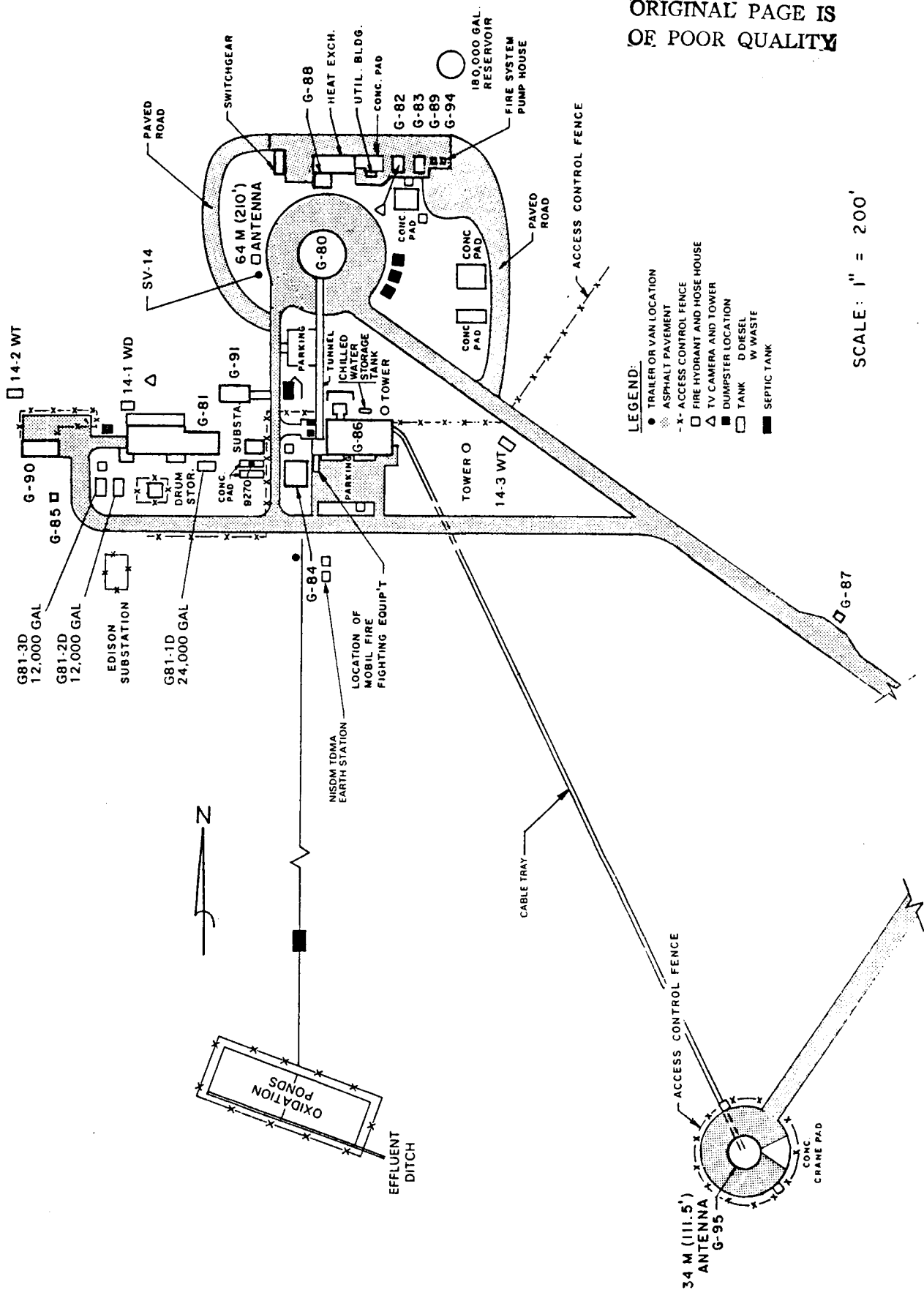


Figure 64. Mars Site: Plot Plan.



23. Building G-80 (Mars Site)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: 1967  
Building type: Cement/cement block  
Number of floors: NOT AVAILABLE  
Total floor area (SF): 9326  
Building use: 64 METER ANTENNA  
Summary of asbestos use (Bldg G-80): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 500  
Thickness of material (in.): 0.125  
Estimated volume (CF): 5  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURES 65 AND 68

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 2000  
Thickness of material (in.): 0.125  
Estimated volume (CF): 21  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach



23. Building G-80 (Mars Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BEIGE TILE WITH WHITE STREAKS. SEE FIGURES 65 AND 67

FLOORING MATERIALS (Reference GD)

Asbestos-bearing material found in: 9 X 9 TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 500  
Thickness of material (in.): 0.125  
Estimated volume (CF): 5  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURES 65 AND 68

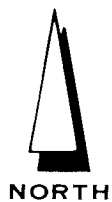
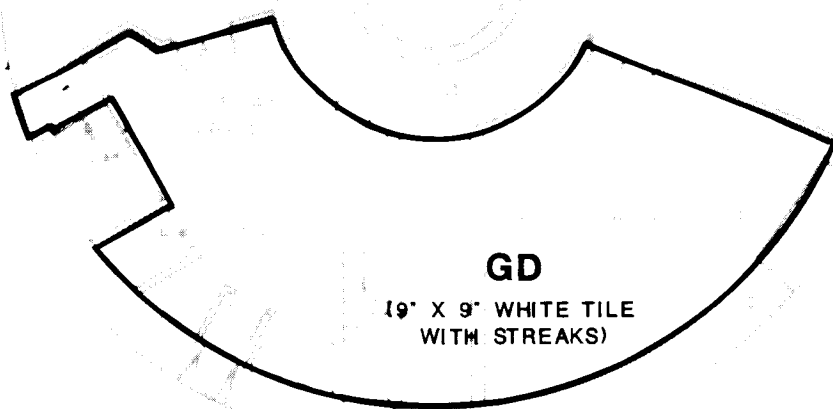
ORIGINAL PAGE IS  
OF POOR QUALITY

(See Figure 68)

(See Figure 67)

(See Figure 66)

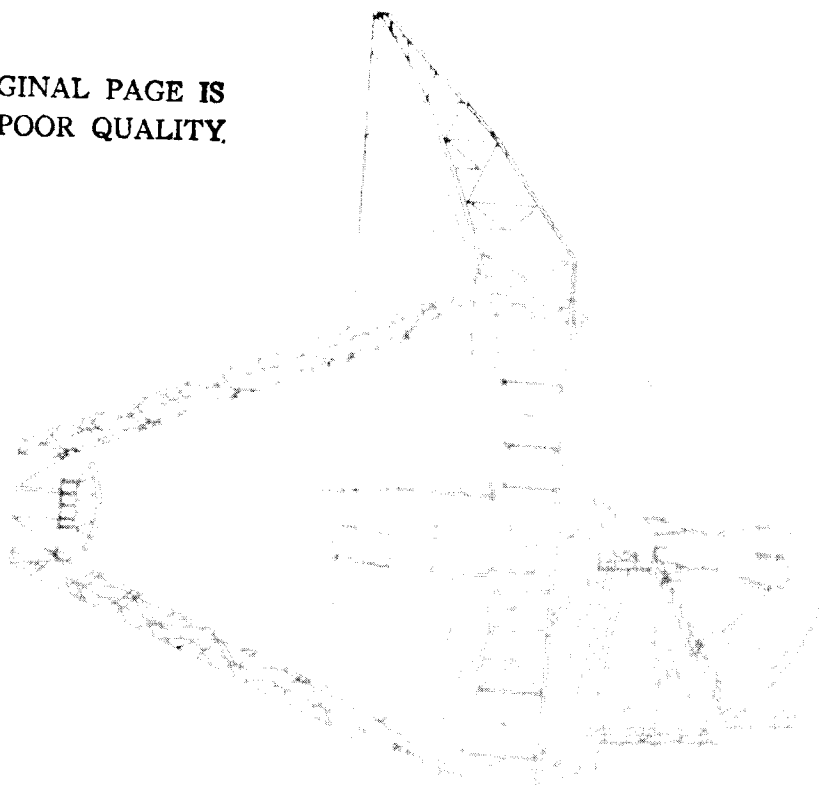
Figure 65. Mars Site: 64-Meter Antenna Building G-80.



ORIGINAL PAGE IS  
OF POOR QUALITY

Figure 66. Mars Site: Building G-80, First Floor.

ORIGINAL PAGE IS  
OF POOR QUALITY



(See Figure 65 to 68)

(See Figure 64 to 67)

(See Figure 63 to 66)

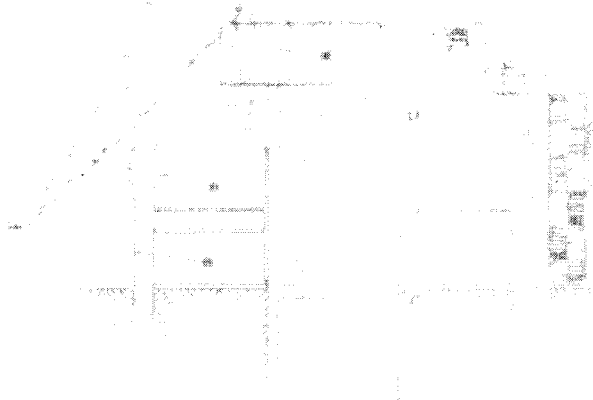
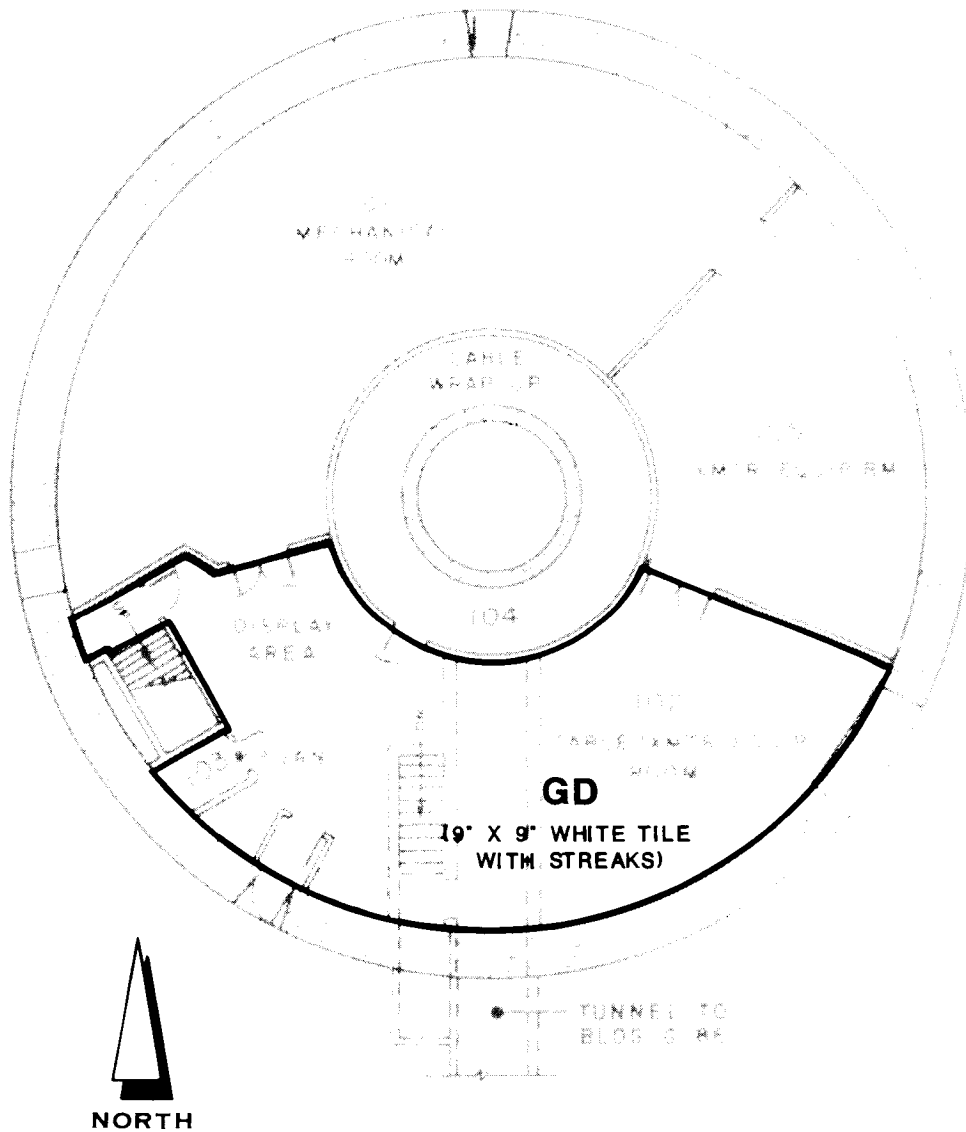


Figure 65. Mars Site: 64-Meter Antenna Building G-80.



ORIGINAL PAGE IS  
OF POOR QUALITY

Figure 66. Mars Site: Building G-80, First Floor.

ORIGINAL PAGE IS  
OF POOR QUALITY

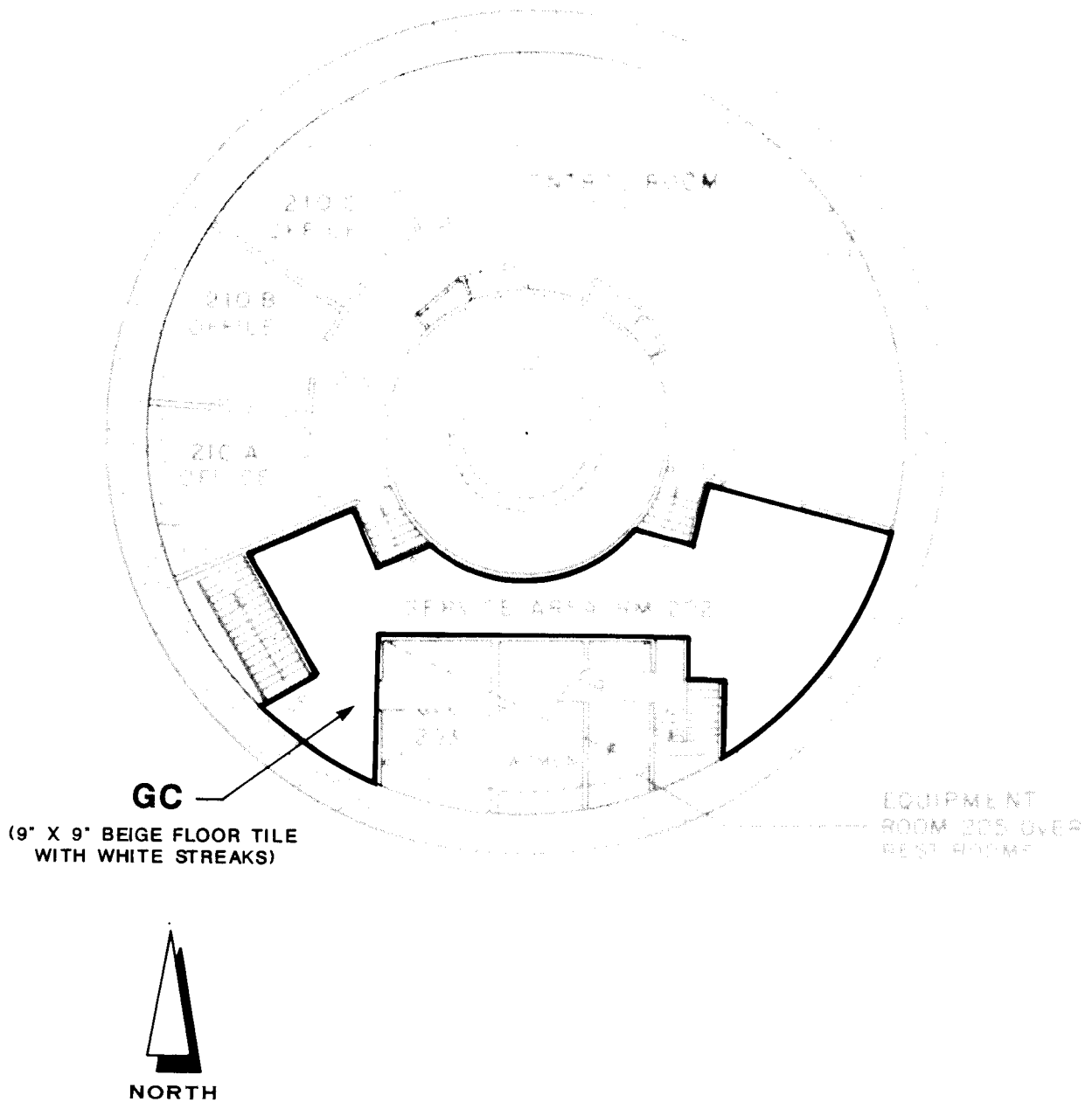


Figure 67. Mars Site: Building G-80, Second Floor.



24. BUILDING G-81 (Mars Site)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: NOT AVAILABLE  
Building type: Cement/cement block.  
Number of floors: 1  
Total floor area (SF): 7340  
Building use: GENERATOR BUILDING  
Summary of asbestos use (Bldg G-81): Roofing material

ROOF MATERIAL (Reference 22)

Asbestos-containing material found in: ROOFING  
Friable or non-friable: Non-friable  
Surface area (SF): 5,000  
Thickness of material (in.): 3.75  
Estimated volume (CF): 1562.5  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Support  
Work population: None  
Ventilation: Natural  
Accessibility to area: > 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Normal vibrations from fans, closing doors, noise, etc.  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ROOF MATERIAL COVERED WITH TAR. SEE FIGURE 69



ORIGINAL PAGE IS  
OF POOR QUALITY.

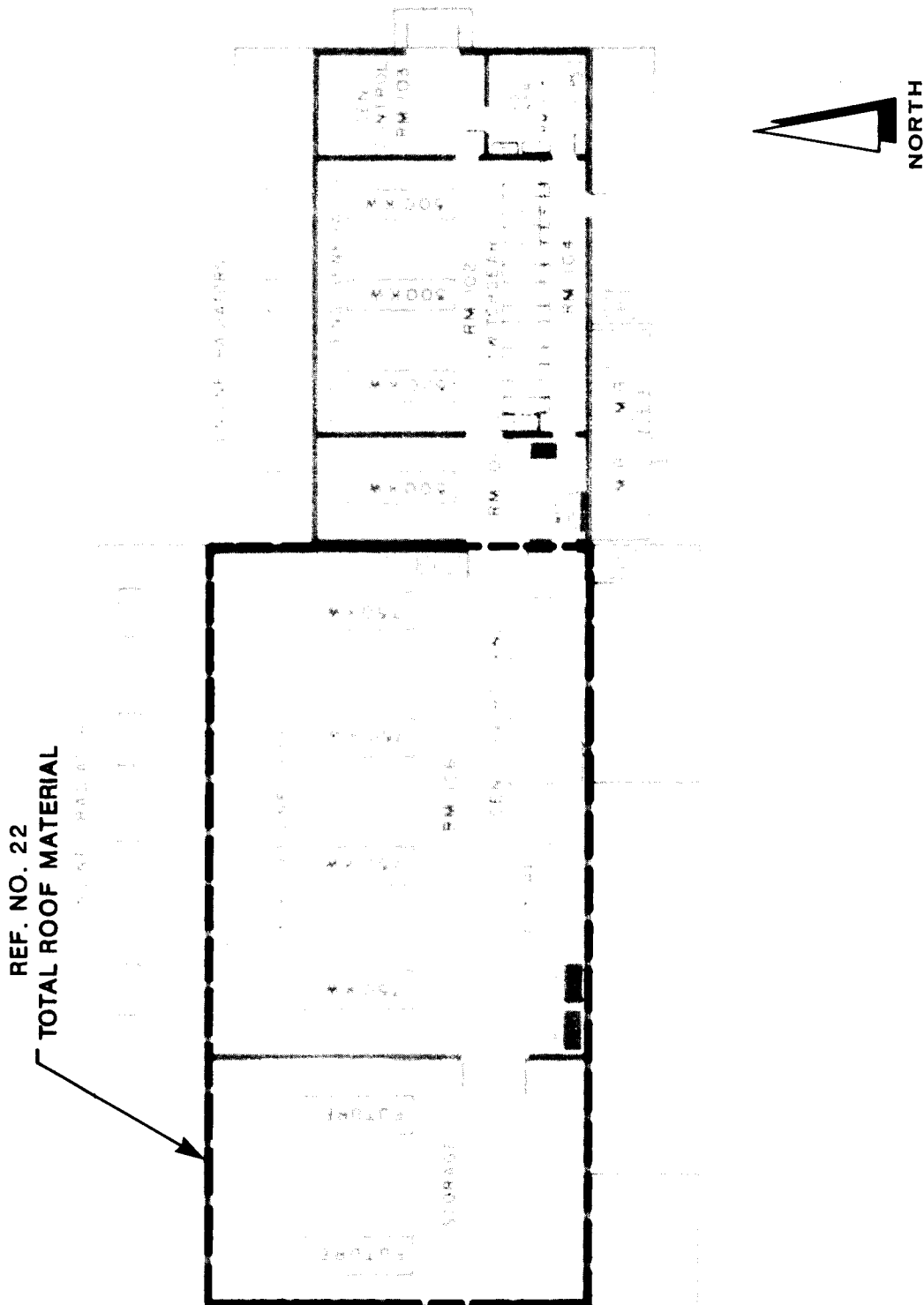


Figure 69. Mars Site: Generator Building G-81.

PRECEDING PAGE BLANK NOT FILMED

25. Building G-86 (Mars Site)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: 1969  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 13680  
Building use: OPERATIONS SUPPORT  
Summary of asbestos use (Bldg G-86): Floors, pipelines (interior), roofing materials

PIPE LINES (Reference AA)

Location of pipes: RM 104  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 5.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: STRAIGHT PIPE LAGGING HARD CEMENTITIOUS MATERIAL. SEE FIGURE 70

PIPE LINES (Reference AB)

Location of pipes: RM 104  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder

25. Building G-86 (Mars Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: STRAIGHT PIPE LAGGING HAS HARD CEMENTITIOUS MATERIAL.  
SEE FIGURE 70

PIPE LINES (Reference AC)

Location of pipes: RM 104  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW HARD CEMENTITIOUS MATERIAL. SEE FIGURE 70

PIPE LINES (Reference AD)

Location of pipes: RM 104  
Pipe diameter with insulation (in.): 4.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 1.00  
Estimated insulation volume: (CF) 1.00  
Condition of lagging material: Some physical damage (scuffs, tears, bruises.)  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural

25. Building G-86 (Mars Site) (Cont'd)

Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ELBOW HAS HARD CEMENTITIOUS MATERIAL. SEE FIGURE 70

WALL STRUCTURES/PARTITIONS (Reference CA)

Asbestos-bearing material found in: Wall structure  
Friable or non-friable: Non-friable  
Surface area (SF): 768  
Thickness of material (in.): 0.75  
Estimated volume of asbestos (CF): 48  
Condition of material: Undisturbed  
Types of coatings present: Coatings/encapsulants  
Building use near asbestos: Casual or incidental  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: TAPE VAULT WALLS ARE IN GOOD CONDITION. MAINTAIN A GOOD PROTECTIVE COATING ON WALLS. SEE FIGURE 70

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 7150  
Thickness of material (in.): 0.125  
Estimated volume (CF): 75  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach

25. Building G-86 (Mars Site) (Cont'd)

Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

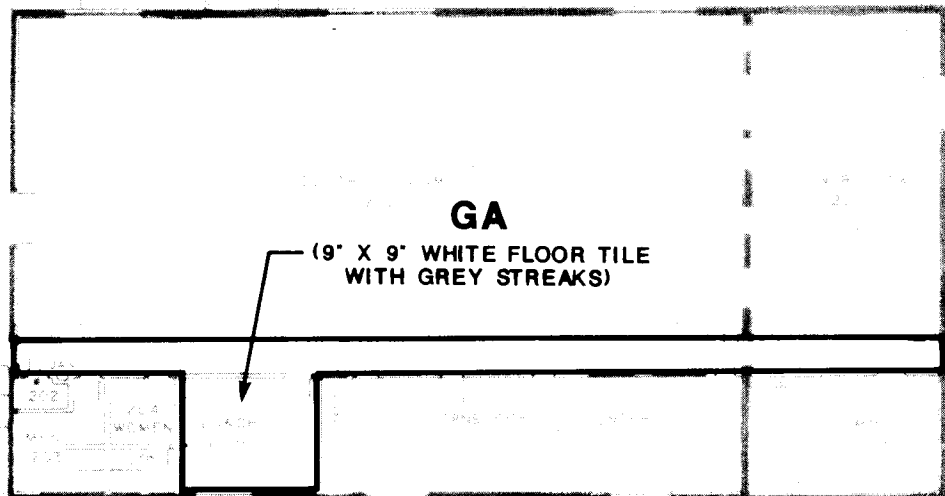
Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURE 70

ROOF MATERIAL (Reference 23)

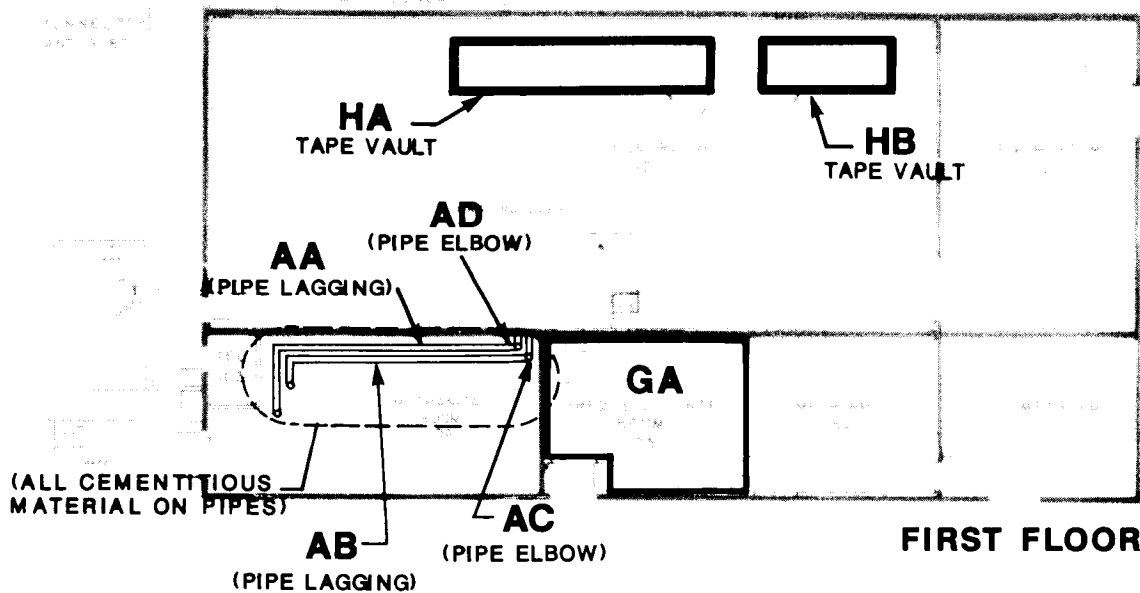
Asbestos-containing material found in: ROOFING  
Friable or non-friable: Non-friable  
Surface area (SF): 1,440  
Thickness of material (in.): 4.25  
Estimated volume (CF): 510  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Support  
Work population: None  
Ventilation: Natural  
Accessibility to area: > 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Normal vibrations from fans, closing doors, noise, etc.  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ROOF MATERIAL COVERED WITH TAR. SEE FIGURE 71

ORIGINAL PAGE IS  
OF POOR QUALITY



**SECOND FLOOR**



**FIRST FLOOR**

Figure 70. Mars Site: Operations Support Building G-86.

REF. NO. 23  
TOTAL ROOF MATERIAL

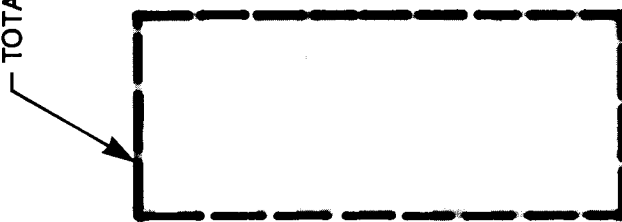


Figure 71. Mars Site: Operations Support Building G-86.

ORIGINAL PAGE IS  
OF POOR QUALITY

ORIGINAL PAGE IS  
OF POOR QUALITY



Figure 72. Mars Site: Building G-86, Tape Vault Plenum Room 101, Typical Tape Vaults  
Constructed of Asbestos-Containing Transite Board.



ORIGINAL PAGE IS  
OF POOR QUALITY

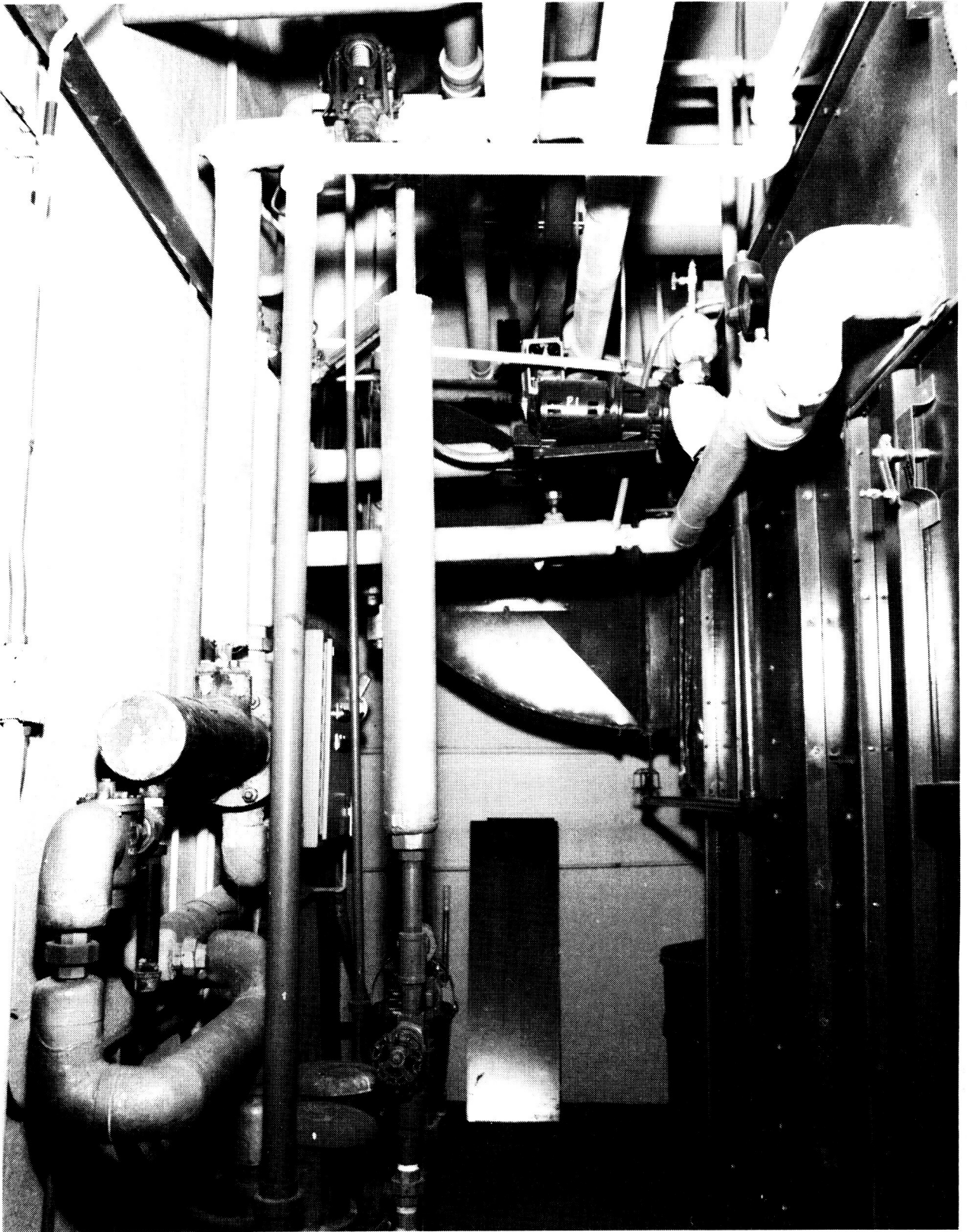


Figure 73. Mars Site: Building G-86, Mechanical Equipment Room 104,  
Asbestos-Containing Pipe Lagging.

ORIGINAL PAGE IS  
OF POOR QUALITY

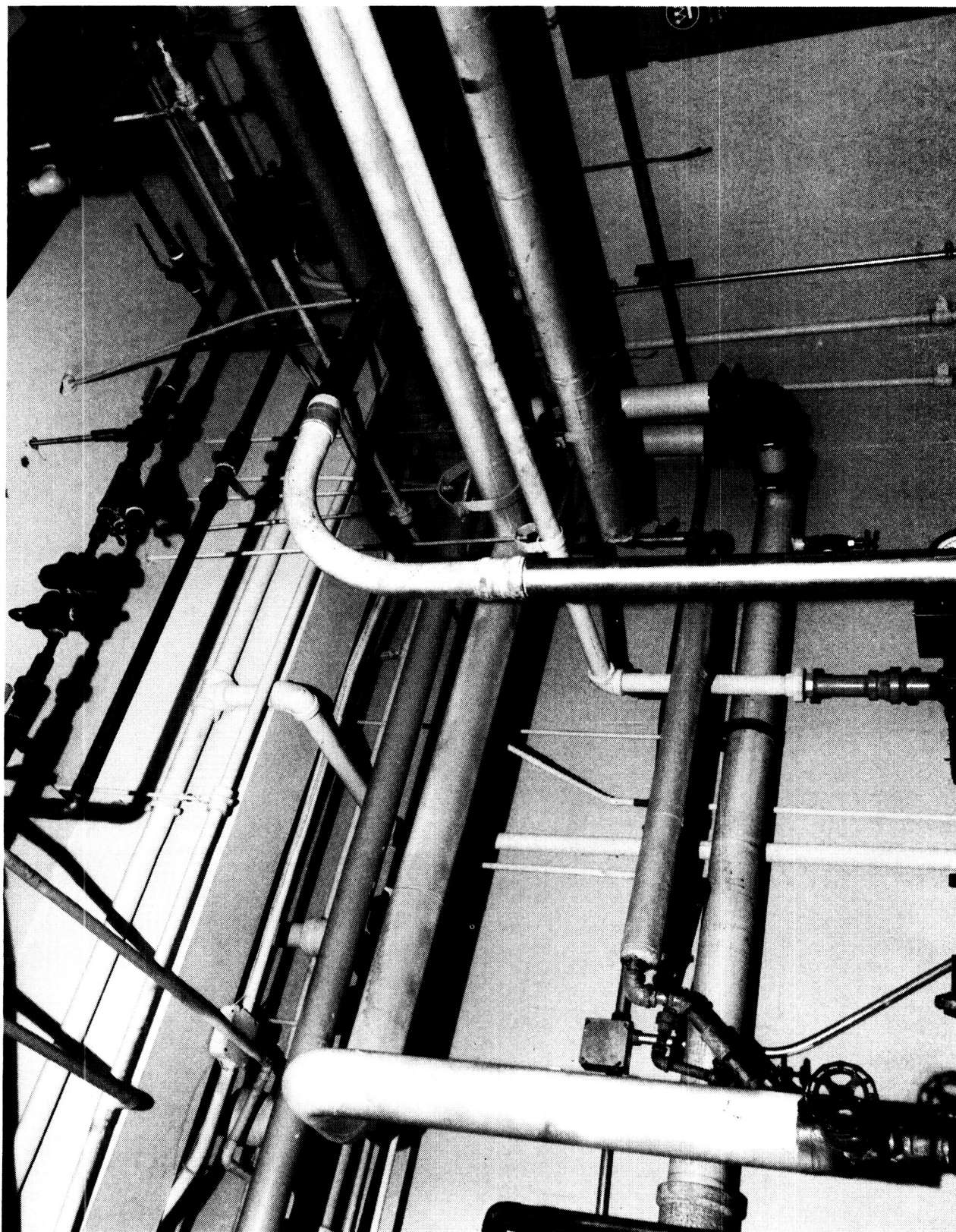


Figure 74. Mars Site: Building G-86, Mechanical Equipment Room 104,  
Asbestos-Containing Pipe Lagging.

26. Building G-93 (Main Gate House)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: 1968  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 270  
Building use: MAIN GATE HOUSE  
Summary of asbestos use (Bldg G-93): Floors

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 270  
Thickness of material (in.): 0.125  
Estimated volume (CF): 3  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: Local forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY SPECKS, AS IN G-42  
SEE FIGURE 75

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

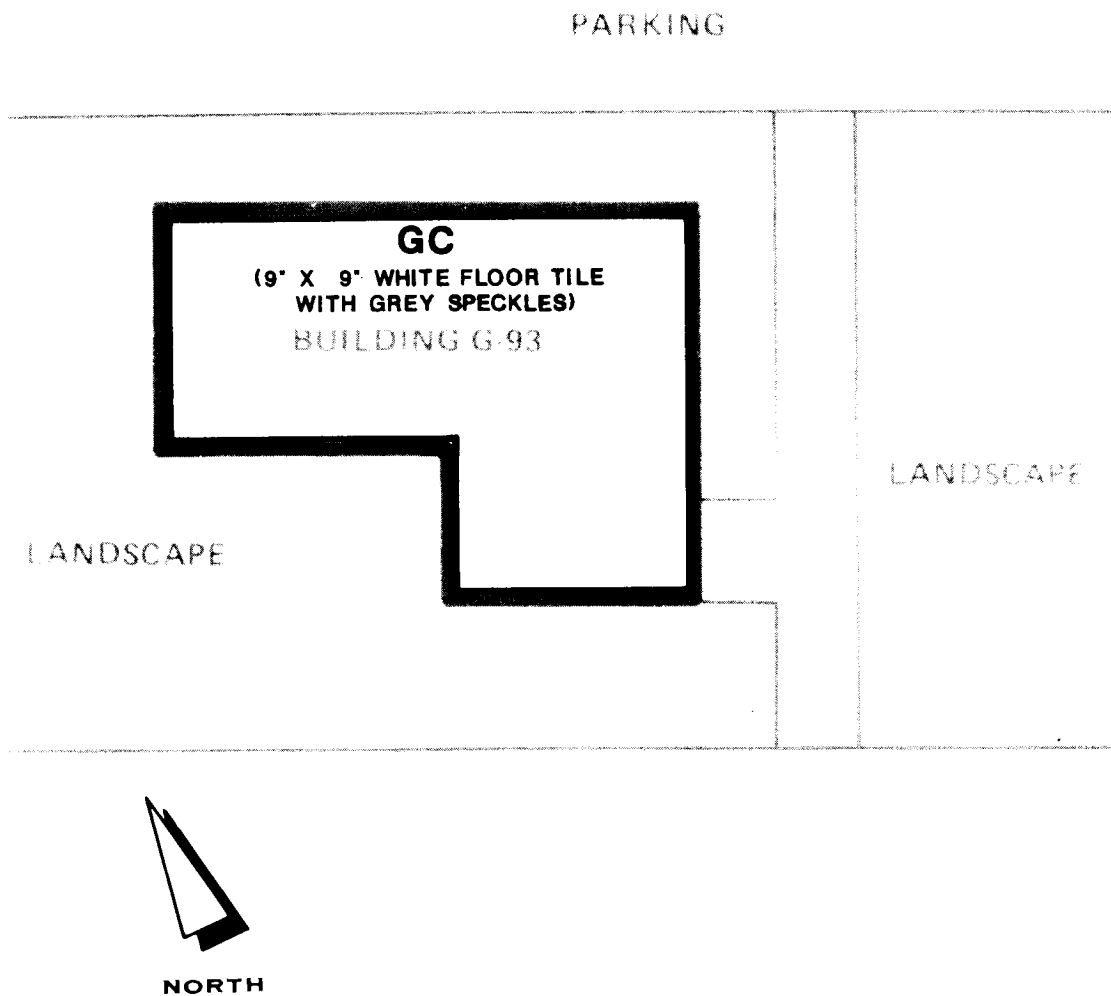


Figure 75. GDSCC: Main Gate House Building G-93.

PRECEDING PAGE BLANK NOT FILMED

27. Building Barstow (Barstow Facility)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: NOT AVAILABLE  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 28343  
Building use: BARSTOW FACILITY  
Summary of asbestos use (Bldg BARSTOW): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: LINOLEUM  
Friable or non-friable: Non-friable  
Surface area (SF): 2212  
Thickness of material (in.): 0.250  
Estimated volume (CF): 46  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: BEIGE LINOLEUM USED IN ROOMS 127 AND 130A-E. SEE FIGURE 76

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 12 X 12 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 21000  
Thickness of material(in.): 0.125  
Estimated volume (CF): 219  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes

27. Building Barstow (Barstow Facility) (Cont'd)

Suggested Abatement timing: At time of demolition

Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: 12 X 12 in. WHITE TILE. PRIMARY FLOORING USED. SEE FIGURE 76

**GB** (12' X 12' WHITE FLOOR TILE)

**GA** (BEIGE LINOLEUM)

**GB**

**GA**

**GB**

LABORATORY 101  
RECEPTION 102  
OFFICE 103  
STORAGE 104  
RESTROOM 105  
KITCHEN 106  
MAIN ENTRANCE  
REAR ENTRANCE

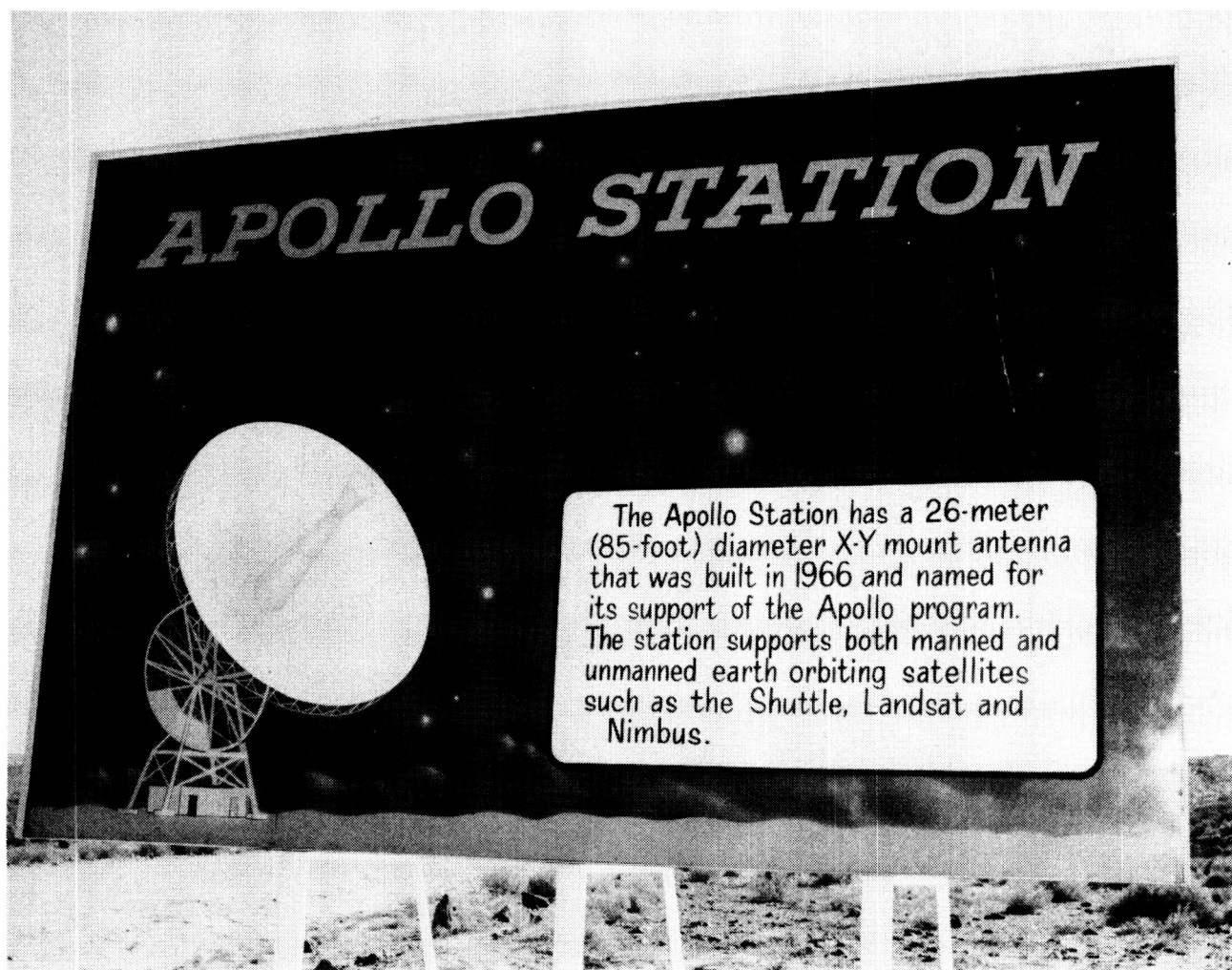


Figure 76. Barstow Facility



APOLLO STATION  
DSS 16

ORIGINAL PAGE IS  
OF POOR QUALITY



The Apollo Station has a 26-meter (85-foot) diameter X-Y mount antenna that was built in 1966 and named for its support of the Apollo program. The station supports both manned and unmanned earth orbiting satellites such as the Shuttle, Landsat and Nimbus.

This 26-meter (85 ft) antenna, built in 1965 by the NASA Goddard Space Tracking and Data Network (STDN) to support the manned Apollo missions to the Moon, was transferred to the DSN in October 1984. The antenna is used to support satellites in both low- and high-Earth orbits as well as STS (Space Shuttle) missions.

PRECEDING PAGE BLANK NOT FILMED



ORIGINAL PAGE IS  
OF POOR QUALITY

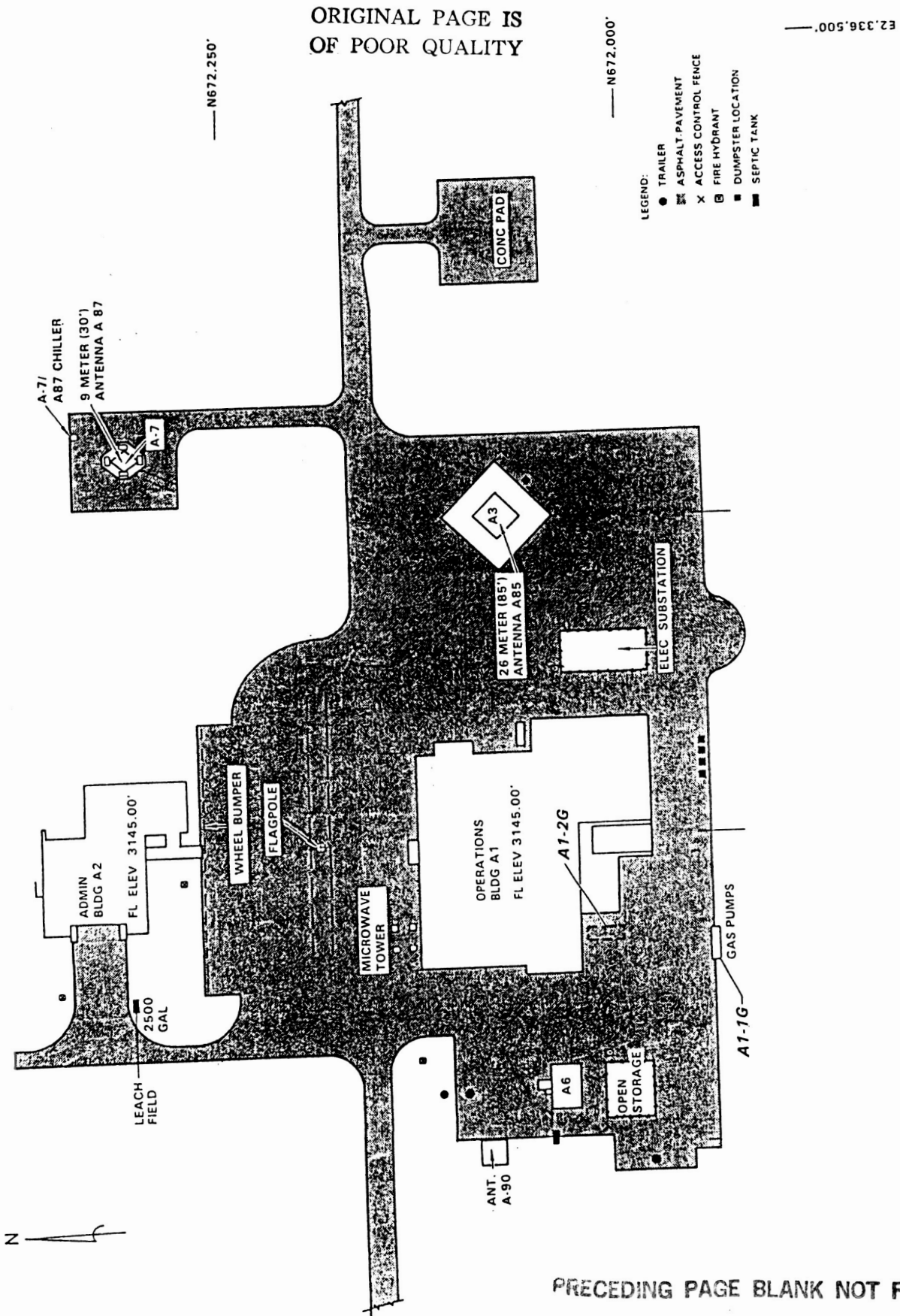


Figure 77. Apollo Site: Plot Plan

PRECEDING PAGE BLANK NOT FILMED

28. Building A-1 (Apollo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 672,000/E 2,336,000  
Construction date: NOT AVAILABLE  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 17409  
Building use: OPERATIONS BUILDING  
Summary of asbestos use (Bldg A-1): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 4116  
Thickness of material (in.): 0.125  
Estimated volume (CF): 43  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 11-50  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. SIMILAR TO REPLACEMENT TILE USED IN BUILDING M-1. SEE FIGURE 78

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

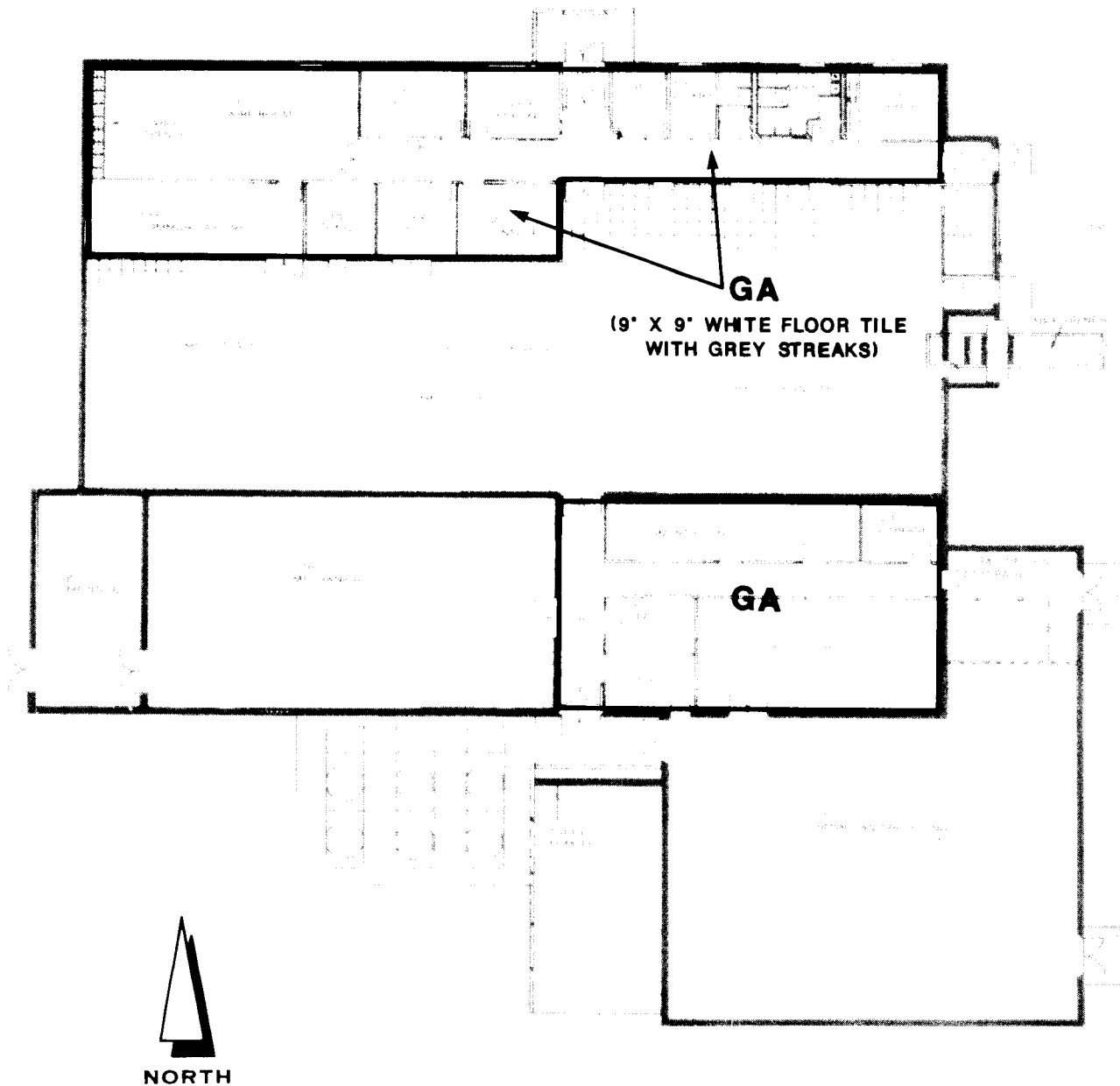


Figure 78. Apollo Site: Operations Building A-1.

PRECEDING PAGE BLANK NOT FILMED

29. Building A-2 (Apollo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 672,250/E 2,336,000  
Construction date: NOT AVAILABLE  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 6134  
Building use: CAFETERIA AND ADMINISTRATION BUILDING  
Summary of asbestos use (Bldg A-2): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1600  
Thickness of material (in.): 0.125  
Estimated volume (CF): 17  
Condition of material: Some delamination evident  
Types of coatings present: None  
Building use near asbestos: Unoccupied at present  
Work population: None  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BEIGE TILE WITH WHITE AND BROWN SPECKS. SEE  
FIGURE 79

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 4  
Thickness of material (in.): 0.125  
Estimated volume (CF): 1  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

29. Building A-2 (Apollo Site) (Cont'd)

Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BEIGE TILE WITH WHITE SPECKS. USED FOR REPLACEMENT. SEE FIGURE 79

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1700  
Thickness of material (in.): 0.125  
Estimated volume (CF): 18  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BEIGE TILE WITH WHITE SPECKS. SEE FIGURE 79

ORIGINAL PAGE IS  
OF POOR QUALITY

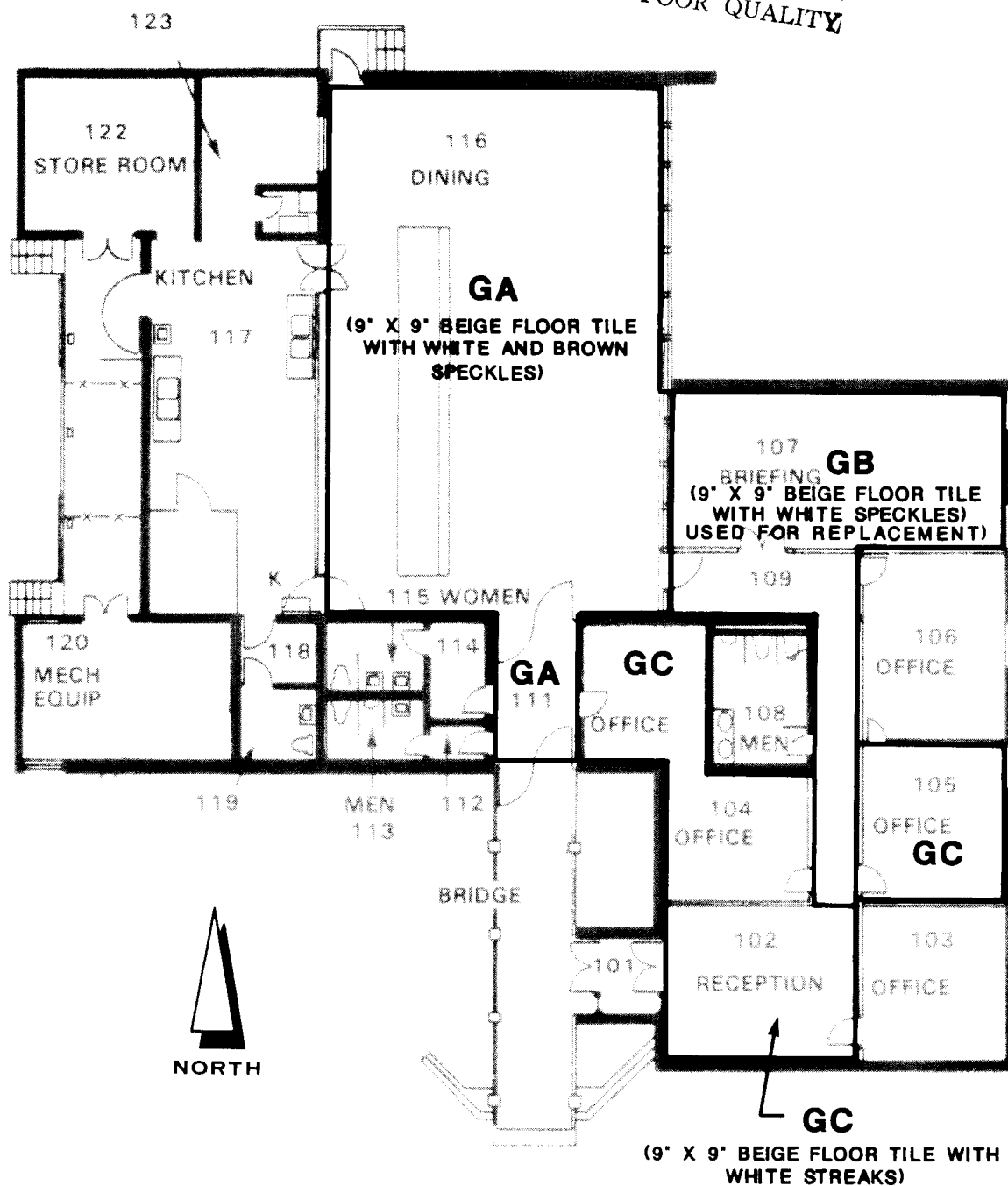


Figure 79. Apollo Site: Cafeteria and Administration Building A-2.

30. Building A-7 (Apollo Site)

GENERAL BUILDING INFORMATION

Map grid location: N 672,300/E 2,336,250  
Construction date: NOT AVAILABLE  
Building type: Butler-type  
Number of floors: 1  
Total floor area (SF): 112  
Building use: ANTENNA EQUIPMENT  
Summary of asbestos use (Bldg A-7): Walls

WALLS STRUCTURES/PARTITIONS (Reference CA)

Asbestos-bearing material found in: WALL STRUCTURE  
Friable or non-friable: Friable  
Surface area (SF): 256  
Thickness of material (in.): 1.000  
Estimated volume (CF): 21  
Condition of material: Undisturbed  
Types of coatings present: Metal covering  
Building use near asbestos: Industrial process  
Work population: None  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: None  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: WALL INSULATION HAS TRACE QUANTITY OF ASBESTOS. SEE FIGURE 80

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

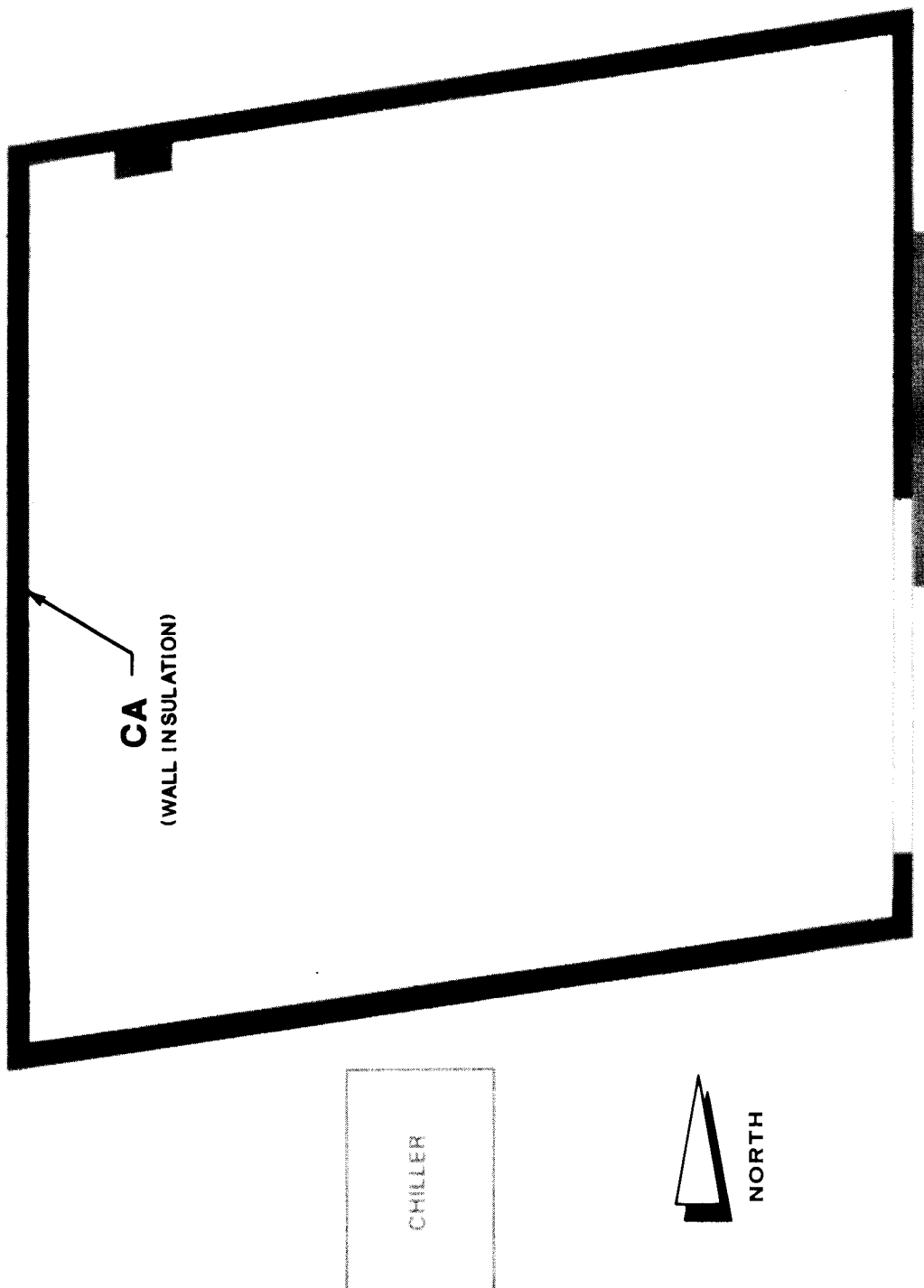


Figure 80. Apollo Site: 9-Meter Antenna Equipment Building A-7.

PRECEDING PAGE BLANK NOT FILMED



ORIGINAL PAGE IS  
OF POOR QUALITY

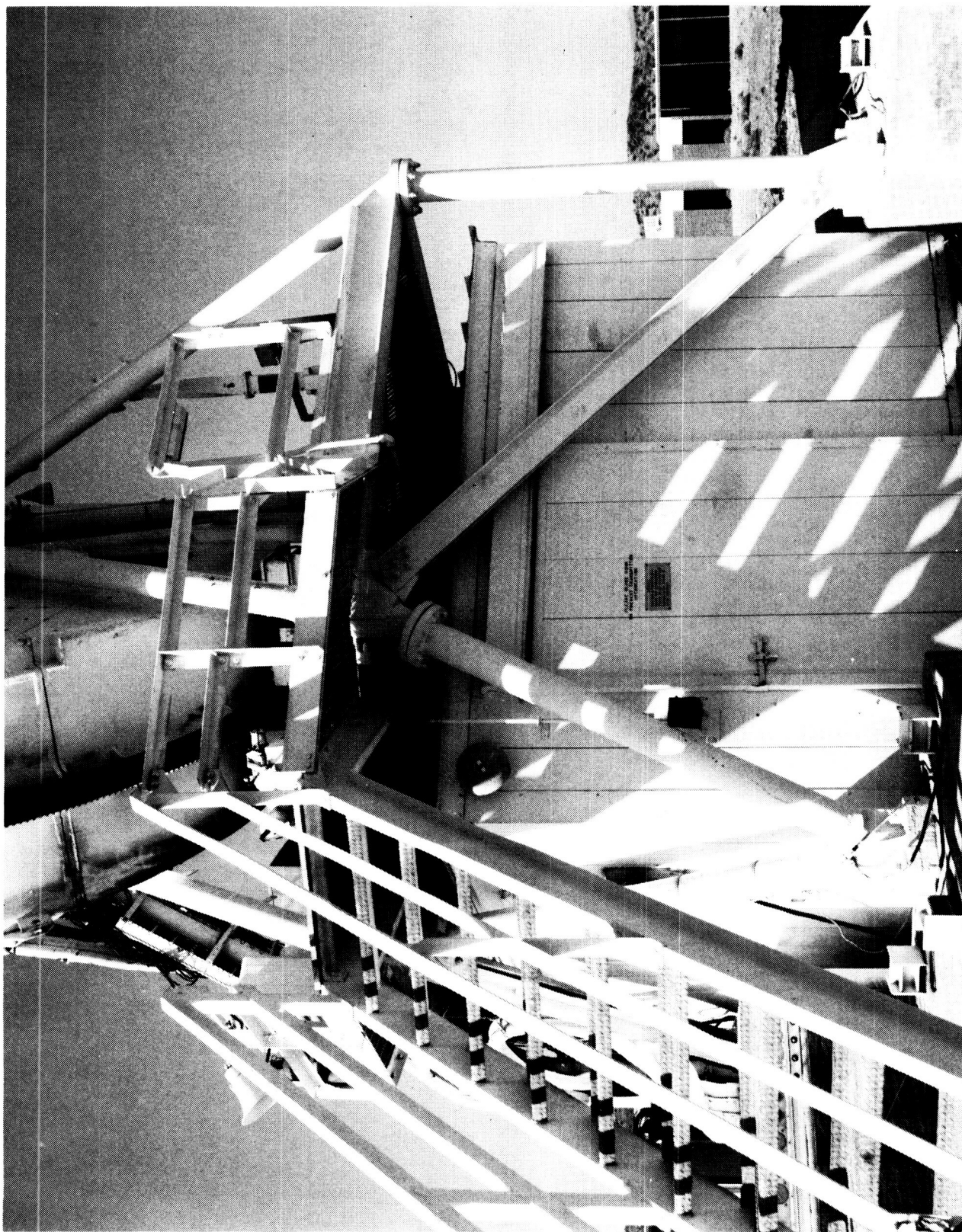


Figure 81. Apollo Site: Building A-7, Asbestos-Containing Insulation in Wall Structure.

PRECEDING PAGE BLANK NOT FILMED

6-225

PAGE 6-224 INTENTIONALLY BLANK

ORIGINAL PAGE IS  
OF POOR QUALITY

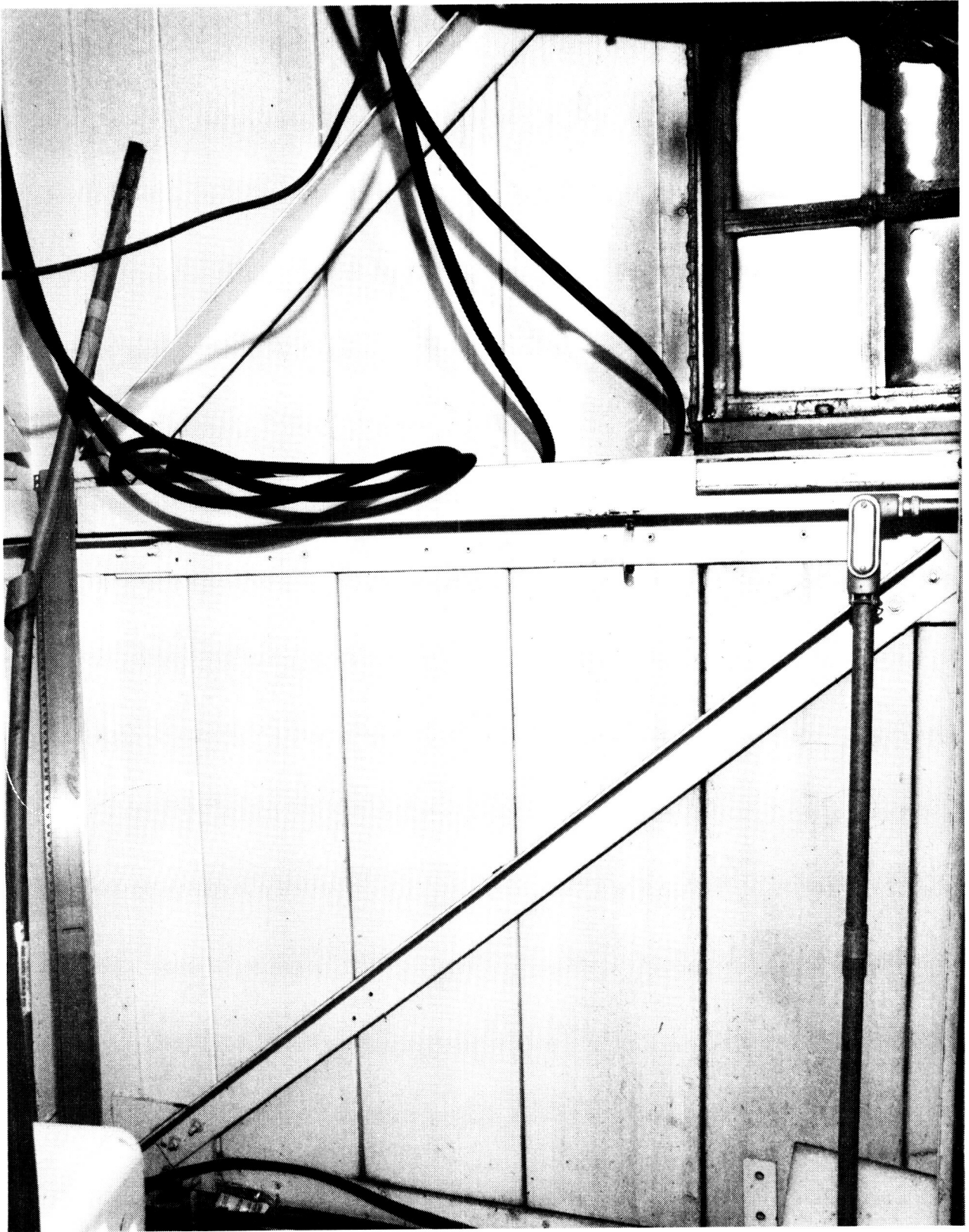


Figure 82. Apollo Site: Building A-7, Asbestos-Containing Insulation in Wall Structure.

31. Building A-8 (Apollo Site)

GENERAL BUILDING INFORMATION

Map grid location: NOT AVAILABLE  
Construction date: NOT AVAILABLE  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 128  
Building use: ANTENNA COLLIMATION TOWER BUILDING  
Summary of asbestos use (Bldg A-8): Roofing

EXTERIOR SIDING/ROOFING MATERIAL (Reference BA)

Asbestos-bearing material found in: ROOFING  
Friable or non-friable: Non-friable  
Surface area (SF): 128  
Thickness of material (in.): 0.062  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Support  
Work population: None  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: None  
Physical disturbances: None  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ROOF MATERIAL COVERED WITH TAR AND GROUND PEBBLES.  
SEE FIGURE 83

ORIGINAL PAGE IS  
OF POOR QUALITY

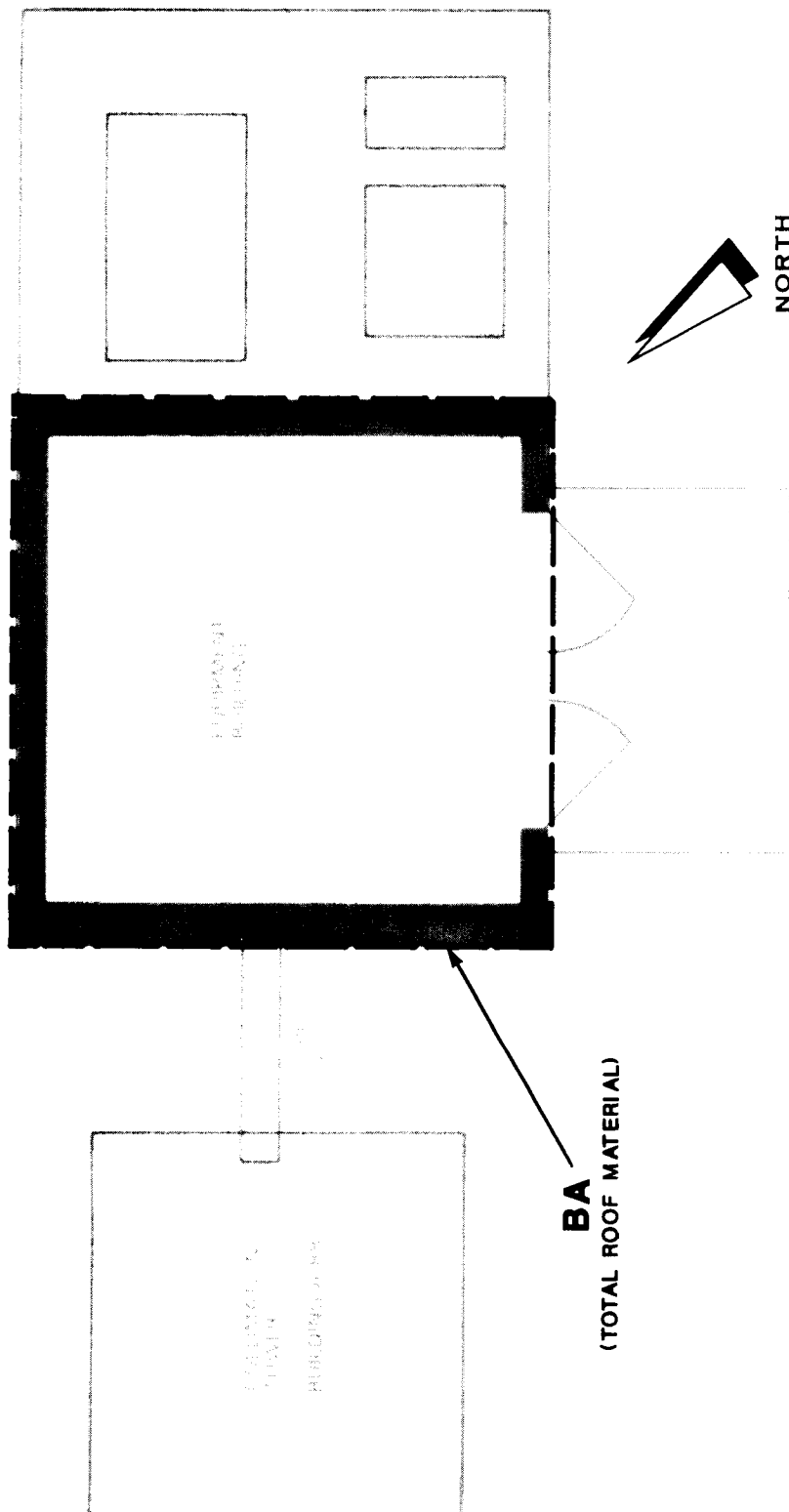


Figure 83. Apollo Site: 9-Meter Antenna Collimation Tower Building A-8.

PRECEDING PAGE BLOCK NOT FILMED



## MOJAVE BASE STATION

ORIGINAL PAGE IS  
OF POOR QUALITY



In addition to the six NASA/JPL DSSs the Goldstone Complex also has a 12-meter (40 ft) antenna at the Mojave Base Station, located near DSS 16, the Apollo Station. This antenna now is operated by NOAA.

PRECEDING PAGE BLANK NOT FILMED

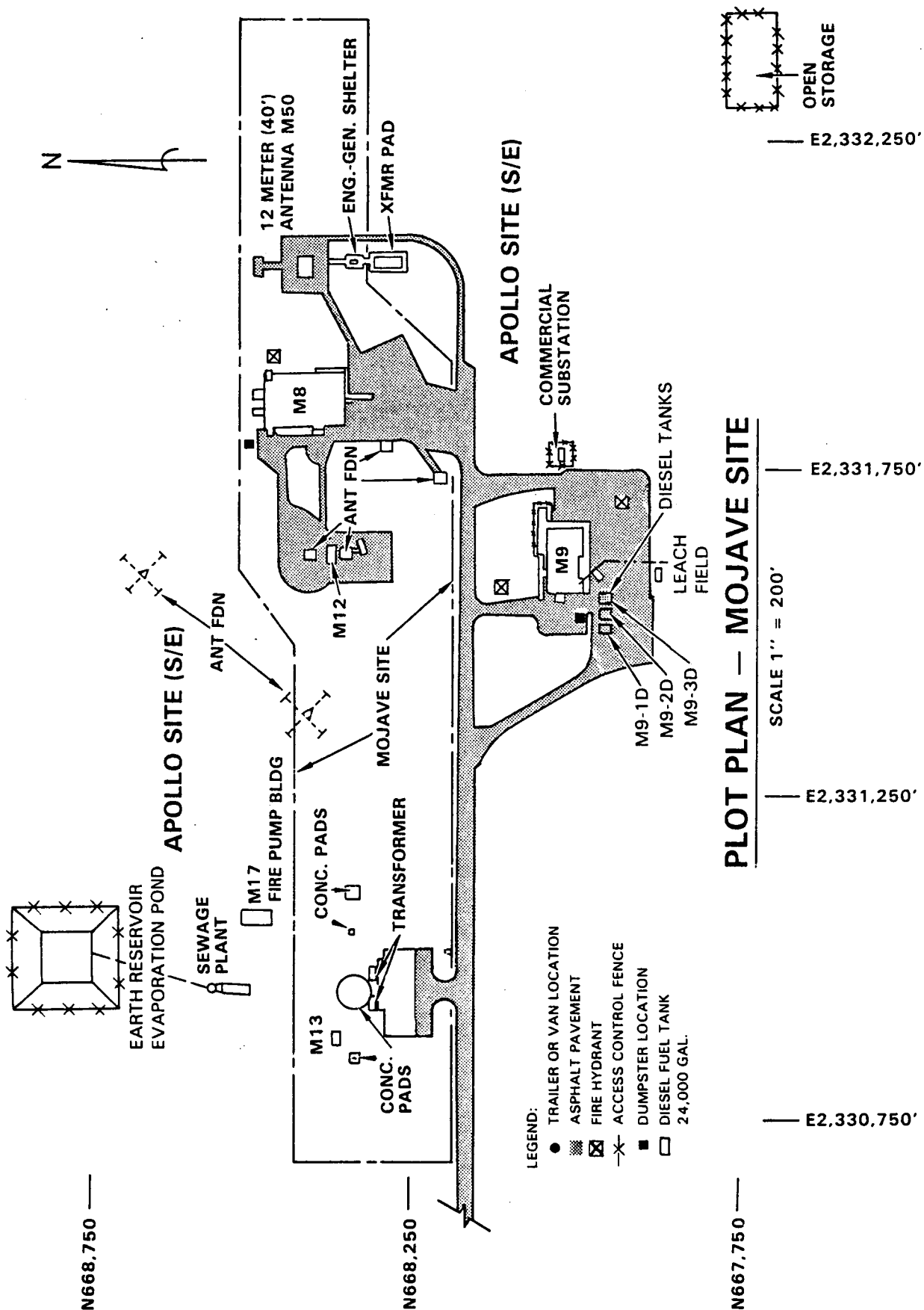


Figure 84. Mojave Base Site: Plot Plan.

32. Building M-1 (Mojave Base Site)

GENERAL BUILDING INFORMATION

Map grid location: N 667,850/ E 2,328,250  
Construction date: NOT AVAILABLE  
Building type: Butler-type  
Number of floors: 1  
Total floor area (SF): 3226  
Building use: MINITRACK  
Summary of asbestos use (Bldg M-1): Floors

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 1  
Thickness of material (in.): 0.125  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Unoccupied at present  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. USED AS REPLACEMENT TILE. SEE FIGURE 85

FLOORING MATERIALS (Reference GC)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 15  
Thickness of material (in.): 0.125  
Estimated volume (CF): 1  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Unoccupied at present  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishings/structures

PRECEDING PAGE BLANK NOT FILMED

32. Building M-1 (Mojave Base Site) (Cont'd)

Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

Presence of sensitive equipment: No

Suggested abatement timing: At time of demolition

Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. BEIGE TILE WITH WHITE STREAKS. SEE FIGURE 85



ORIGINAL PAGE IS  
OF POOR QUALITY

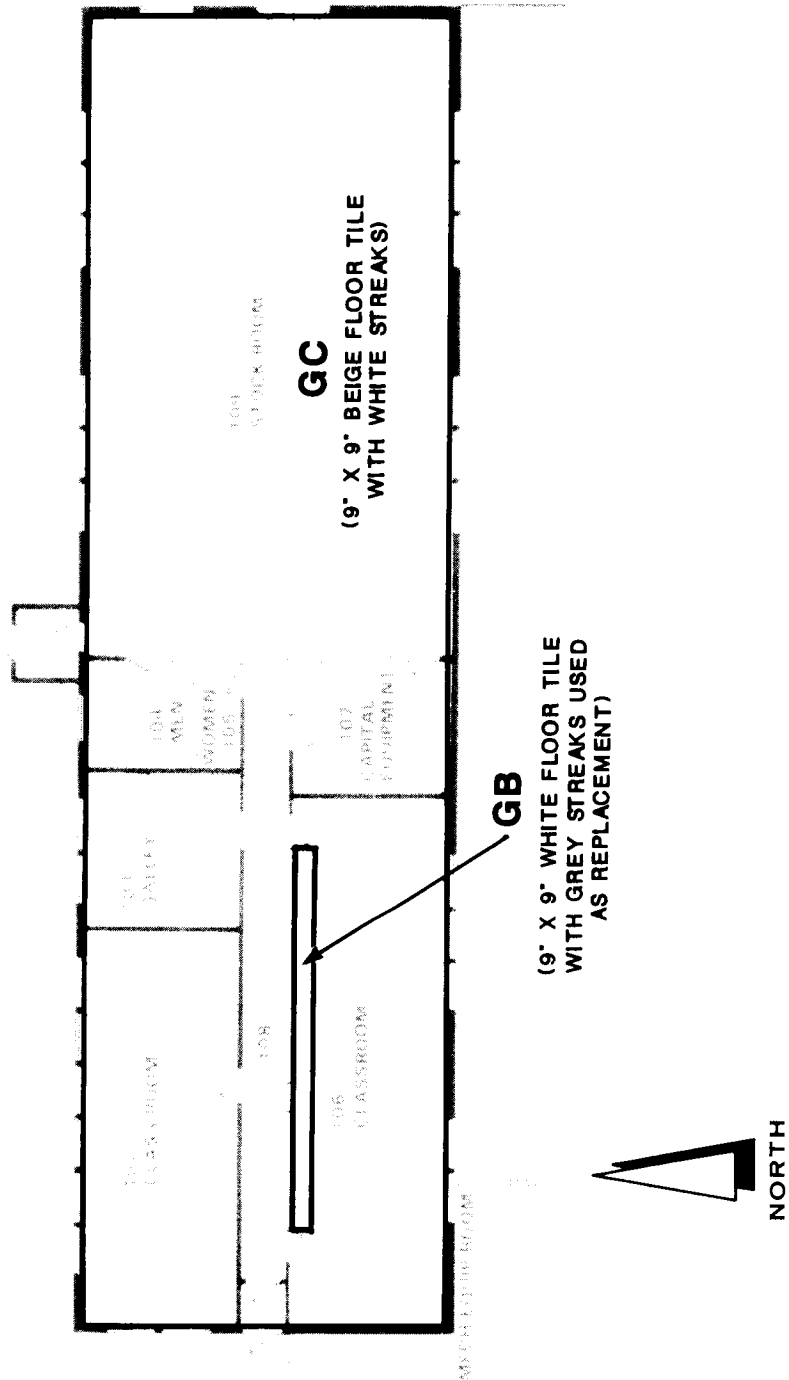


Figure 85. Mojave Base Site: Minitrack Building M-1.

33. Building M-2 (Mojave Base Site)

GENERAL BUILDING INFORMATION

Map grid location: N 667,900/E 2,238,200  
Construction date: NOT AVAILABLE  
Building type: Butler-type  
Number of floors: 1  
Total floor area (SF): 1536  
Building use: LOGISTICS  
Summary of asbestos use (Bldg M-2): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 420  
Thickness of material (in.): 0.125  
Estimated volume (CF): 5  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Unoccupied at present  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. GREEN TILE WITH WHITE STREAKS. GREEN TILE IS APPLIED ON TOP OF GRAY TILE (REF. GB). SEE FIGURE 86

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 420  
Thickness of material (in.): 0.125  
Estimated volume (CF): 5  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Unoccupied at present  
Work population: None  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Portable equipment/furnishings/structures

33. Building M-2 (Mojave Base Site) (Cont'd)

Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)

Presence of sensitive equipment: No

Suggested abatement timing: At time of demolition

Suggested abatement method: Removal

Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. GRAY TILE WITH WHITE SPECKS. GREEN TILE (REF. GA) APPLIED ON TOP OF THIS MATERIAL. SEE FIGURE 86

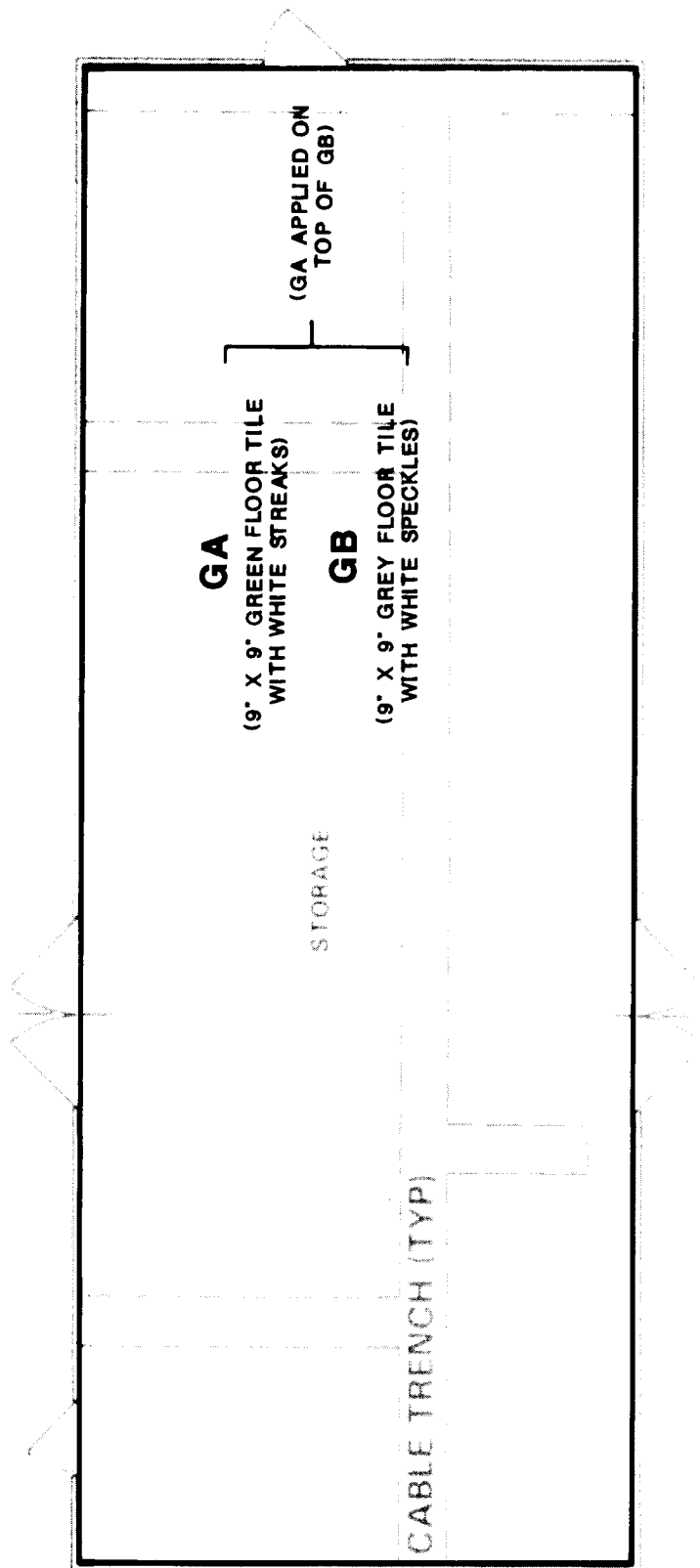


Figure 86. Mojave Base Site: Logistics Building M-2

34. Building M-6 (Mojave Base Site)

GENERAL BUILDING INFORMATION

Map grid location: N 667,900/E 2,329,500  
Construction date: NOT AVAILABLE  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 4729  
Building use: TELEMETRY  
Summary of asbestos use (Bldg M-6): Floors, pipelines (exterior), roofing

PIPE LINES (Reference AA)

Location of pipes: ROOF  
Pipe diameter with insulation (in.): 3.00  
Insulation thickness (in.): 0.750  
Approximate pipe length (LF): 24.00  
Estimated insulation volume (CF): 1.00  
Condition of lagging material: Undisturbed  
Types of coatings present: Cloth covering  
Building use near pipes: Industrial maintenance  
Work population: None  
Ventilation: Natural  
Accessibility to area: 8-ft ladder  
Obstructions to area: None  
Physical disturbances: Normal vibrations from fans, closing doors, noise, etc  
Presence of sensitive equipment: Yes  
Suggested abatement timing: In the near future  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: PIPE CONNECTS A/D UNIT ON ROOF. THERE ARE FOUR UNITS ON THE ROOF. SEE FIGURE 87

EXTERIOR SIDING/ROOF MATERIAL (Reference BA)

Asbestos-bearing material found in: ROOFING  
Friable or non-friable: Non-friable  
Surface area (SF): 4729  
Thickness of material (in.): 0.250  
Estimated volume (CF): 99  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Support  
Work population: None  
Ventilation: Natural  
Accessibility to area: 8-ft ladder

PRECEDING PAGE BLANK NOT FILMED

34. Building M-6 (Mojave Base Site) (Cont'd)

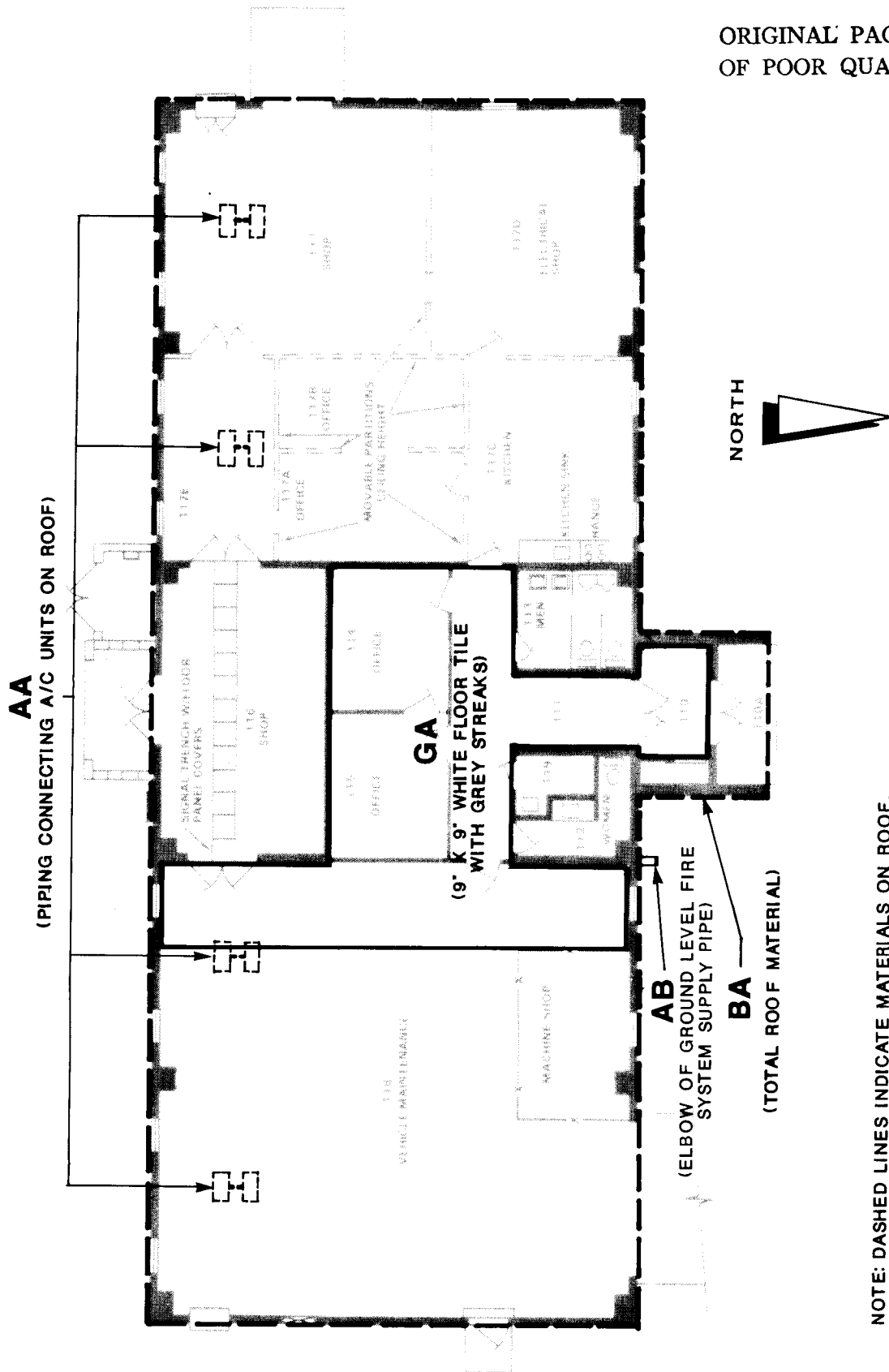
Obstructions to area: Permanent equipment/furnishings/structures  
Physical disturbances: Normal vibrations from fans, closing doors, noise, etc.  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: ROOF MATERIAL COVERED WITH TAR AND GROUND PEBBLES. SEE FIGURE 87

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 778  
Thickness of material (in.): 0.125  
Estimated volume (CF): 8  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: None  
Physical disturbances: None  
Presence of sensitive equipment: No  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURE 87



ORIGINAL PAGE IS  
OF POOR QUALITY

Figure 87. Mojave Base Site: Telemetry Building M-6.

ORIGINAL PAGE IS  
OF POOR QUALITY,

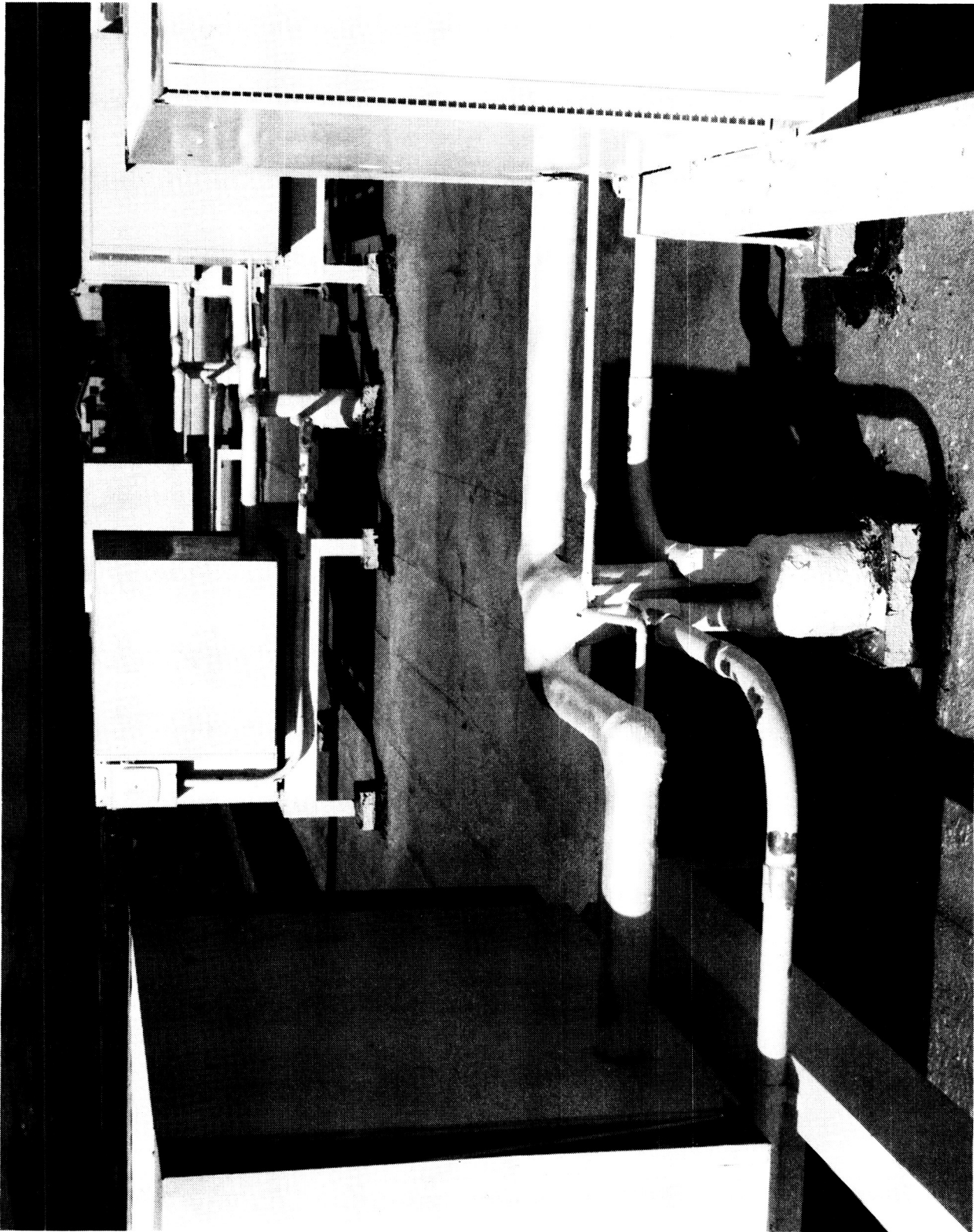


Figure 88. Mojave Base Site: Building M-6, Roof-Mounted Equipment with  
Asbestos-Containing Pipe Lagging.

PRECEDING PAGE BLANK NOT FILMED

6-247

PAGE 6-246 INTENTIONALLY BLANK



35. Building M-8 (Mojave Base Site)

GENERAL BUILDING INFORMATION

Map grid location: N 668,400/E 2,331,850  
Construction date: NOT AVAILABLE  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 10884  
Building use: OPERATIONS  
Summary of asbestos use (Bldg M-8): Floors

FLOORING MATERIALS (Reference GB)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable: Non-friable  
Surface area (SF): 160  
Thickness of material (in.): 0.125  
Estimated volume (CF): 2  
Condition of material: Undisturbed  
Types of coatings present: None  
Building use near asbestos: Office/administration  
Work population: 1-10  
Ventilation: General forced air  
Accessibility to area: 8-ft ladder  
Obstructions to area: None  
Physical disturbances: Physical abuse (scuffing, tearing, bruising, etc.)  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURE 89

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

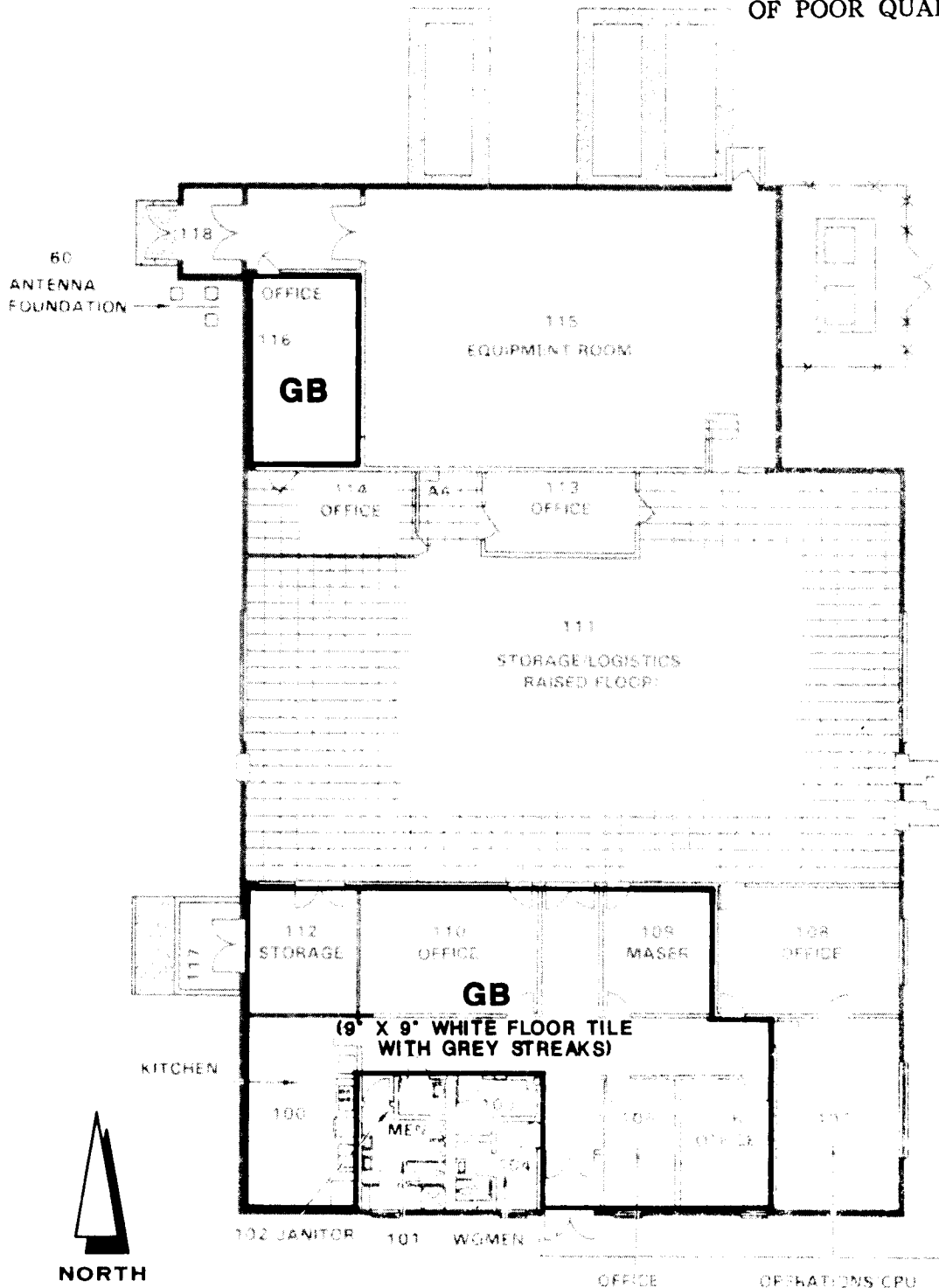


Figure 89. Mojave Base Site: Operations Building M-8.

36. Building M-9 (Mojave Base Site)

GENERAL BUILDING INFORMATION

Map grid location: N 668,000/E 2,331,650  
Construction date: NOT AVAILABLE  
Building type: Cement/cement block  
Number of floors: 1  
Total floor area (SF): 5911  
Building use: GENERATOR  
Summary of asbestos use (Bldg M-9): Floors

FLOORING MATERIALS (Reference GA)

Asbestos-bearing material found in: 9 X 9 in. TILE  
Friable or non-friable  
Surface area (SF): 1344  
Thickness of material (in.): 0.125  
Estimated volume (CF): 14  
Condition of material: Some physical damage (scuffs, tears, bruises)  
Types of coatings present: None  
Building use near asbestos: Industrial maintenance  
Work population: 1-10  
Ventilation: Natural  
Accessibility to area: Within normal reach  
Obstructions to area: Permanent equipment/furnishing/structures  
Physical disturbances: Normal vibrations from fans, closing doors, noise, etc.  
Presence of sensitive equipment: Yes  
Suggested abatement timing: At time of demolition  
Suggested abatement method: Removal  
Suggested airborne monitoring: None required under normal conditions

Comments: 9 X 9 in. WHITE TILE WITH GRAY STREAKS. SEE FIGURE 90

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

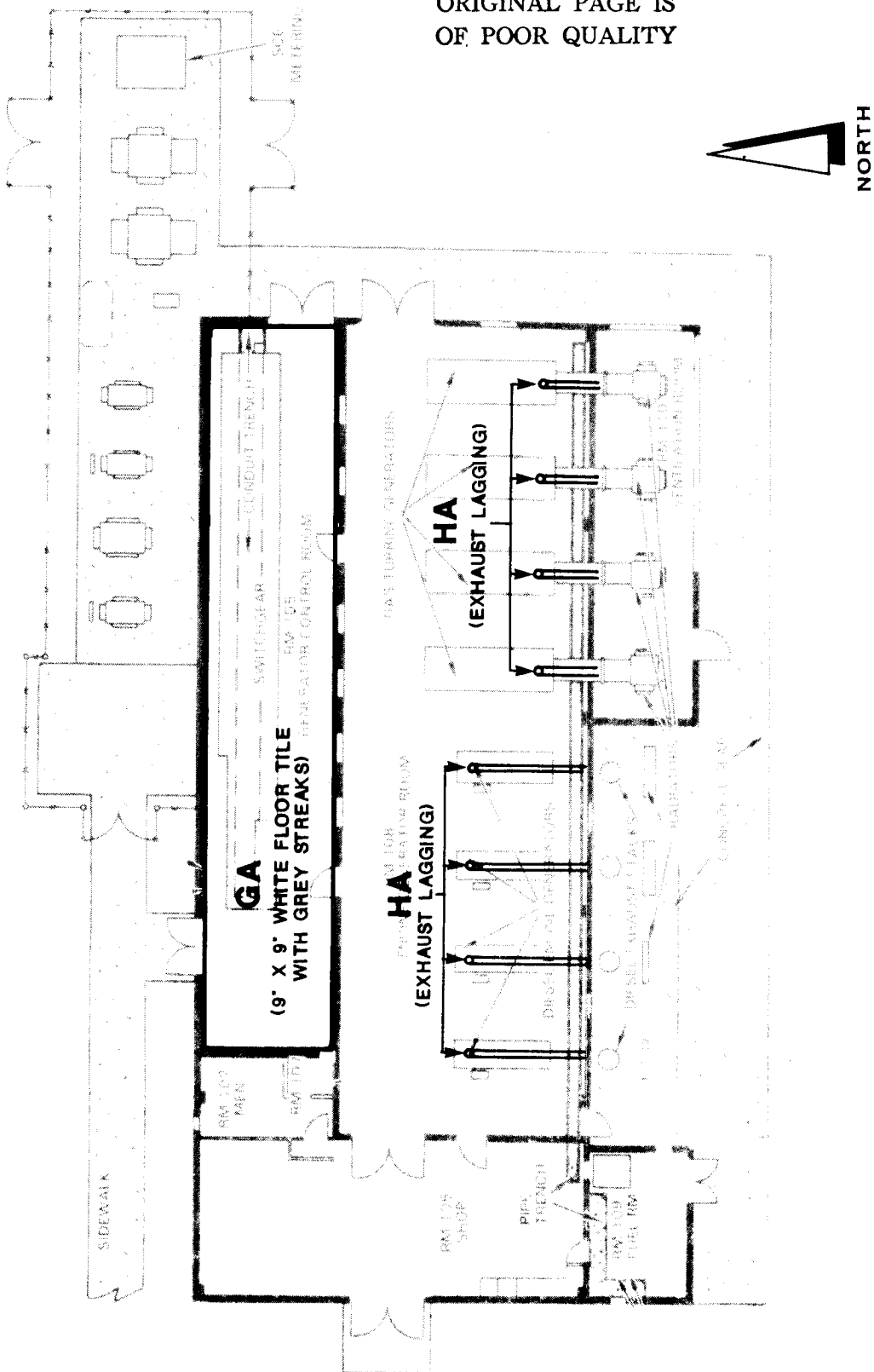


Figure 90. Mojave Base Site: Generator Building M-9.

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY.

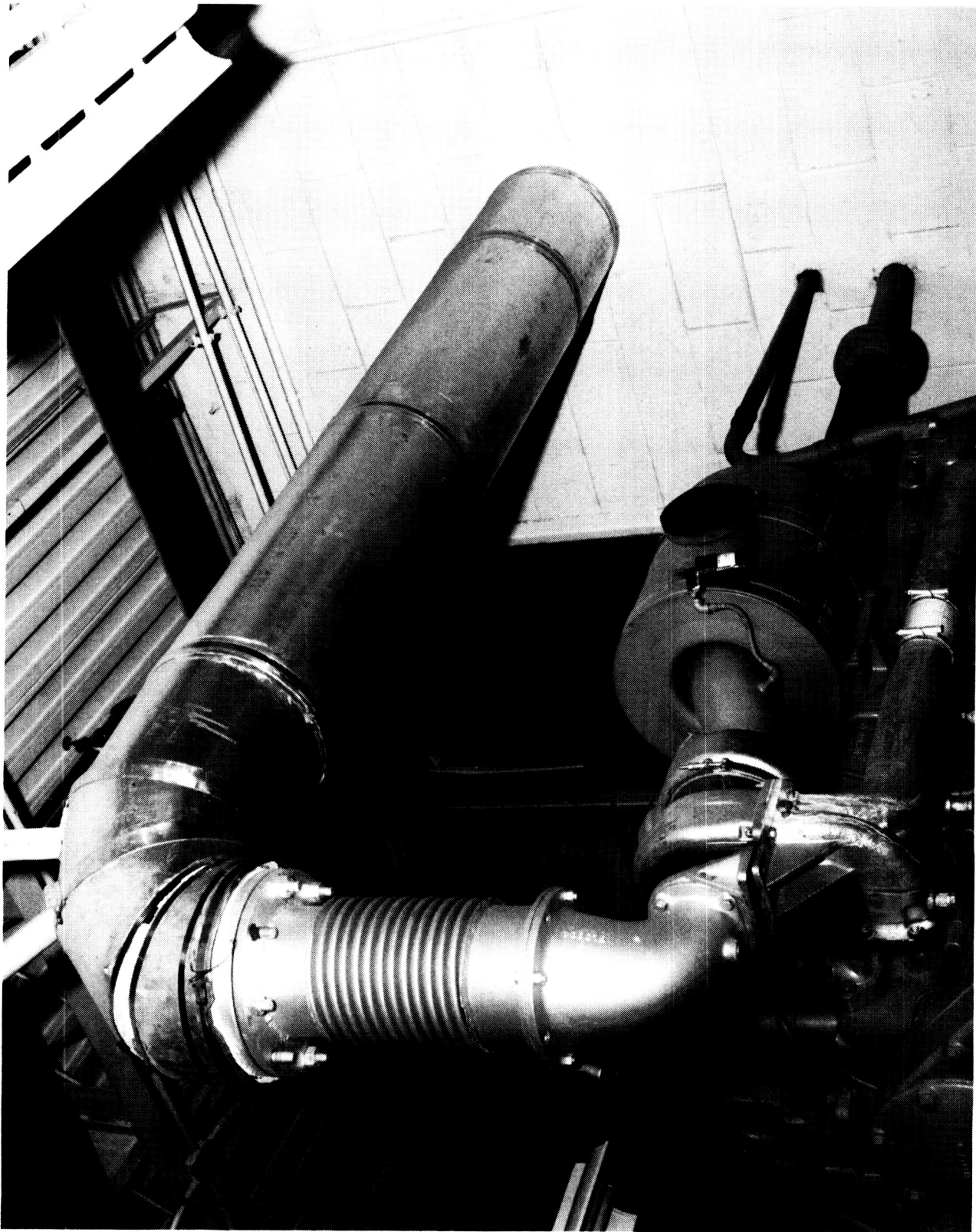


Figure 91. Mojave Base Site: Building M-9, Engine Generator and Gas Turbine Generator Room 108, Typical Asbestos-Containing Lagging for Engine Exhaust Piping.

PREVIOUS PAGE BLANK NOT FILMED

### 37. Miscellaneous Uses of Asbestos at the GDSCC

During the asbestos field survey, field personnel discovered several uses of asbestos that did not fall into the general categories described in the inventory. These are described below:

- (1) Outside of Building G-46, Echo Site, are three discarded, 6-ft pipe sections lying on the ground, southeast of the building. The pipes were wrapped in a black paper and tar substance that was found to contain asbestos. It is recommended that the pipes be removed at once from the yard, and be properly bagged and labeled for disposal at a Class I hazardous waste landfill or a designated Class II landfill.
- (2) There is a pair of asbestos gloves in Building G-28, Echo Site, in the room with the large oil-filled tank. These should be removed, properly bagged, and labeled for disposal.
- (3) Just outside of Building G-27 on the southwest side, Echo Site, is a pipe elbow wrapped in what appears to be asbestos. The sample taken was destroyed during shipping. This is a small amount of material that should be removed in the near future, because the wrap is in very poor condition.
- (4) It has been reported there is asbestos on a pipe located at Echo Site, in the attic of Building G-21, above Room 133. Field personnel entered the attic area through a crawl space, but could not locate the pipe. The possibility that there could be friable asbestos in the attic should be noted by the GDSCC Safety Officer to ensure that maintenance personnel entering the attic space will be properly protected from exposure.
- (5) There is an asbestos-wrapped boiler in Building G-23, Room 107, at Echo Site that is reported to be lined with brick containing asbestos. It is recommended that the boiler wrapping be removed and replaced with non-asbestos-bearing insulation. The brick inside of the boiler would not normally be considered to pose an exposure risk, as long as the boiler were not disassembled for servicing. If the boiler is older and in need of replacement, it is recommended that it be replaced with equipment that contains no asbestos. Removal and replacement of the boiler would completely eliminate any risk of asbestos exposure.
- (6) The area used to collect and store solid waste at the Echo Site landfill was surveyed for asbestos. No asbestos was found. There were no trenches open at the time of survey, so samples were not taken from the landfill. It was reported that construction debris containing asbestos could have been deposited in the landfill in the past, although not in any appreciable amount and not with any frequency.

- (7) At Building G-55, Venus Site, there is a mechanical box that is wrapped in a cloth material that was found to contain asbestos. The box is located on the first landing of the antenna, in proximity to the mechanism that allows movement of the antenna. It is recommended that the insulation be removed and replaced with non-asbestos insulation, if the box is located in an area where worker exposure is of concern. Maintenance personnel should be alerted to the presence of asbestos, and should not be permitted to work on equipment in the box without proper asbestos safety training and appropriate protective gear.
- (8) In Building A-5, the Hydraulic Repair Building, Apollo Site, an asbestos blanket and gloves were found inside on a shelf a few feet from the main doorway. These materials should be collected, bagged, and labeled for disposal at a Class I hazardous waste landfill or at a designated Class II landfill. An acceptable non-asbestos substitute should be provided to service the building. MBGA field personnel were informed that several workers carry asbestos gloves in their trucks. The GDSCC Safety Officer should collect these and similar asbestos-containing materials and prohibit their use.
- (9) Building A-7, 9M Equipment House, Apollo Site, is the only building found to use wall insulation containing asbestos. It should be noted that the sample taken contained only trace quantities of asbestos (less than 1 percent).
- (10) Preformed gaskets and gasket sheeting containing asbestos were found in Buildings G-24, G-46, and A-5. It was reported that these materials are in common usage at the GDSCC. Maintenance personnel are aware of the asbestos and have received training in the proper handling of gasket material and use of protective gear.
- (11) Trenches at the abandoned landfill at the Mojave Base Site were examined for asbestos. No asbestos was found.
- (12) Buildings G-22, G-27, G-38, G-58, and M-6 were found to have external pipes, at ground level, that were insulated at the elbows with asbestos-containing material.
- (13) An unearthed and broken section of a typical asbestos-containing, underground electrical conduit is illustrated in Figure 87.



Figure 92. Typical Asbestos-Containing, Underground Electrical Conduit (Unearthed and Broken).



## SECTION VII

### ASBESTOS ABATEMENT PLAN

#### A. INTRODUCTION

The objective of this abatement plan is to provide guidance for the removal of asbestos-containing material from buildings and structures at the GDSCC at such time that abatement is scheduled. The removal of asbestos is regulated in California by the Department of Industrial Relations (Cal/OSHA) under Title 8 of the California Administrative Code (8 CAC 5208) and by the Department of Health Services under Title 22 (22 CAC 6600). Air pollution standards are enforced by the San Bernardino Air Pollution Control District under the District's Rule 1002. In addition, Federal regulations covering the control and removal of asbestos can be found in the Code of Federal Regulations in Title 40 (regulation of the USEPA, 40 CFR 61) and in Title 49 (regulations of the Department of Transportation, 49 CFR 173.1090). Standards and practices contained in the following abatement plan are derived from these state and Federal regulations.

The plan provides a description of removal and control methods (Section VII B) as well as step-by-step procedures (Section VII C). The following appendixes provide contractor selection criteria (Appendix F), abatement checklist (Appendix G), and a discussion of respiratory protection devices (Appendix H).

#### B. ASBESTOS ABATEMENT AND CONTROL MEASURES

##### 1. Removal, Disposal and Replacement

Many asbestos abatement experts believe removal of friable asbestos-containing material to be the only final and satisfactory solution to the problem of asbestos exposure. Competently performed with adequate protection for workers and building occupants, removal can eliminate all potential for exposure. On the other hand, removal may be more complicated and cost more initially (although not necessarily in the long run) than other abatement measures.

The vast majority of friable asbestos-containing material found at the GDSCC during the October 1986 through November 1986 survey is used to insulate pipes (wrapping) and boilers (jacketing). Asbestos-containing pipe insulation may take several forms, including chalky mixtures of magnesia and asbestos, preformed fibrous asbestos wrapping, asbestos fiber felt, corrugated paper, and insulating cement. In most cases, the insulating material is covered with a protective covering (lagging) made of cloth, tape, paper, metal or cement. Most of the asbestos-containing pipe insulation identified at the GDSCC is a chalky mixture of magnesia and asbestos wrapping covered with a protective cover of cloth.

To remove smaller quantities of pipe insulation, typical of conditions at the GDSCC, containment "glove bags" with sealed holes for hand access are alternatives to full-room or full-work area containment. As shown in Figure 93, these bags are positioned around the pipe insulation and sealed to

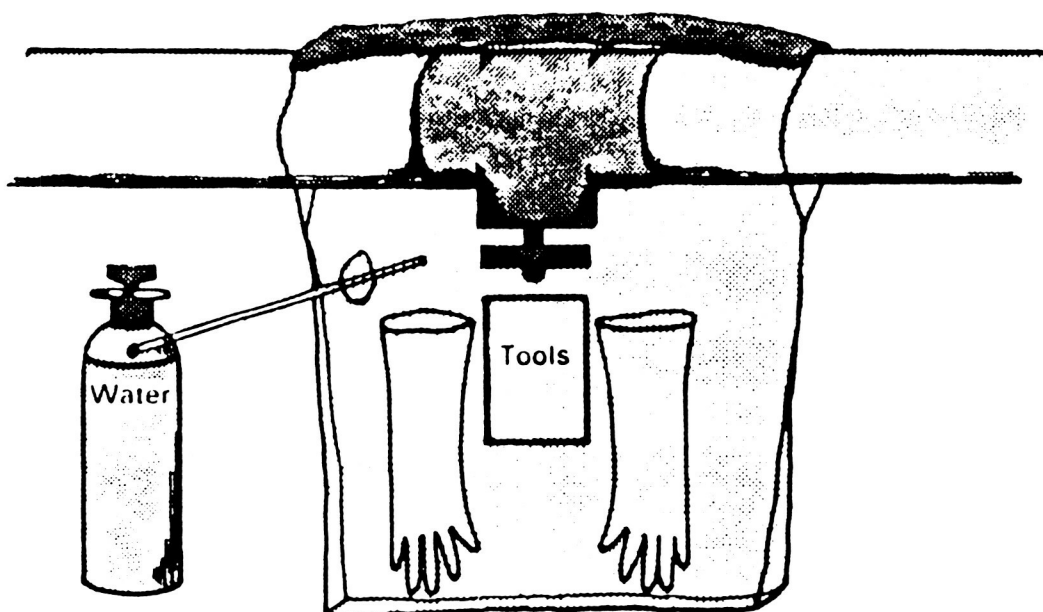


Figure 93. Illustration of "Glove Box" Apparatus used in the Removal of Small Areas of Asbestos.

the pipe with tape. Armholes and an inside pouch for tools let the worker remove insulation without exposure to asbestos fibers. A sealed side port can also be constructed to allow access for wetting the asbestos and evacuating the bag with a HEPA-filtered vacuum. Glove bags are available commercially.

All asbestos-containing material removed during an abatement action must be double-bagged, labeled, and disposed of in accordance with Federal, state, and local regulations. Replacement of removed insulation with non-asbestos insulation (fiberglass) may be done by the asbestos abatement contractor or by a separate contractor.

## 2. Encapsulation with Sealants

Encapsulation involves spraying (or brushing) friable asbestos-containing material with a sealant. Ideally, this activity helps bind together the asbestos fibers and other material components and offers some resistance to impact damage. The technique is normally not used for pipe and boiler insulation. It is reported that occasionally Los Angeles School District maintenance personnel will spray a penetrating sealant on slightly damaged areas of asbestos material to provide a quick temporary repair. As with enclosures (see Section VII B3 below), encapsulants are, at best, a temporary control measure. The asbestos-containing materials will still have to be removed before building demolition or at such time that the protective coating or enclosure is damaged. In addition, the presence of encapsulants can make wetting and thus removing the material more difficult in the future.

In removing asbestos insulation from pipes and boilers, it is common for a contractor to apply a sealant to the metal surface of a pipe or boiler after the insulation has been removed. This sealant application binds any slight surface asbestos contamination to the metal.

## 3. Enclosure

Enclosure involves applying procedures for sealing off asbestos-containing material behind air-tight, impermeable, permanent barriers. In the case of the GDSCC, two potential "enclosure" situations exist:

- (1) Where friable asbestos-containing pipe insulation materials are not accessible for removal (e.g., behind walls, in limited access ceiling spaces), it may be possible to permanently seal-in (enclose) the space that contains the pipes. Commonly used enclosure systems include lath and plaster, gypsum wallboard, brick and mortar, and other permanent systems. One shortcoming in using this approach is that the enclosure will have to be removed if pipes require repair or replacement.
- (2) Damaged asbestos-containing insulation on pipe and boilers can be temporarily repaired using duct tape to seal open joints, and by plastering damaged areas. This is considered a temporary measure. A more permanent enclosure is metal wrapping of pipe and boiler insulation.

#### 4. Interim Measures to Protect Personnel

It is recognized that it usually takes some time before a large-scale asbestos-abatement project can be implemented at a facility. Money must be budgeted, formal plans and specifications prepared, bids received, etc. It is probable that one or two years will be required before an abatement project is completed. In the meanwhile, it is recommended that certain steps be taken to protect personnel against exposure to asbestos.

The first step is to identify all areas where asbestos-containing materials exist. The asbestos-containing materials in each area can be identified and classified as follows:

- (1) Non-friable cementitious asbestos-containing materials (floor tiles, siding, roofing) pose no hazard to personnel except when the material is being worked on (drilled, sawed, etc.) in a manner that causes dust to be generated.
- (2) Friable asbestos-containing material (pipe insulation), which is in good, undisturbed condition with wrapping intact. Custodial and maintenance personnel should be cautioned to avoid damaging or disturbing such friable ACMs. Because of potential hazard to custodial and maintenance personnel, however, all friable asbestos is to be removed from the GDSCC (see Section IX).
- (3) Friable asbestos-containing material (pipe insulation), which is slightly damaged in a few limited areas but is otherwise in good, undisturbed condition with wrapping intact, can have temporary repairs made with duct tape, metal wrapping, plaster, etc., and the area thoroughly cleaned of asbestos fibers. Proper methods must be used as discussed below in Section VII C. It must be again emphasized that custodial and maintenance personnel must be cautioned to avoid any additional damage to the protective wrapping. Because of potential hazard to custodial and maintenance personnel, however, all friable asbestos is to be removed from the GDSCC (see Section IX).

Periodic re-assessments should be made to determine probable exposure risks from asbestos. Observations should be made to determine the current condition of the asbestos material, asking the following questions: "What is the potential for fiber release?" and, "Is the asbestos material in an obviously deteriorating condition?" Current building use and activity patterns should be noted as well. If these factors change, re-assessment of exposure risks should be made and corrective actions taken. Access to areas with high exposure potential should be prohibited without approval for entry by the GDSCC Safety Officer. Exposure risks to friable asbestos will be eliminated when all friable asbestos is removed from the GDSCC (see Section IX).

#### C. TYPICAL ASBESTOS ABATEMENT PROCEDURES

##### 1. Reporting Requirements

a. Registration as a Carcinogen User. Prior to any handling, removal, renovation, demolition, or salvage of asbestos-containing materials (ACM), the Facility's Asbestos Coordinator shall register as a carcinogen user.

The following information is requested:

- (1) Name and address of employer.
- (2) A brief description of how asbestos will be handled.
- (3) The number of employees potentially exposed.
- (4) A brief description of the work to be done.

b. Notifications. If ACM is to be removed, Cal/OSHA must be notified in writing, or by a phone-call, at least 24 hours prior to the removal. The district office for notification is:

State of California  
Department of Industrial Relations  
Division of Occupational Safety & Health  
303 W. Third St.  
San Bernardino, CA 92401  
(714) 383-4321

In the event that more than 80 linear meters (260 linear feet) of ACM on pipes or 15 square meters (160 square feet) of friable asbestos are to be removed, the U.S. EPA must be notified. The notification must be postmarked or delivered at least 10 days prior to the planned renovation or removal operation. The office to contact is:

U.S. EPA  
Region IX  
215 Fremont St.  
San Francisco, CA 94105  
(415) 947-7648

## 2. Shutdown of Building During Asbestos-Abatement Activities

It is essential to protect on-site workers and visitors during asbestos-abatement operations. If possible, evacuate the building or require the contractor to work during weekend or vacation periods.

The length of time required for asbestos-abatement work varies as a function of the quantity of material to be removed, the ease with which it can be removed, the difficulty of access and freedom from encumbrances within the work area, the number of personnel in the tear-out crew, and work-shift constraints imposed by the GDSCC on the contractor.

It is customary for the contractor and the GDSCC Engineer-In-Charge (EIC) to discuss conditions at each work site. The following questions should be resolved during the discussion:

- (1) The EIC stipulates whether the building can be evacuated of GDSCC workers, for how long, and during what calendar periods.
- (2) The contractor estimates the length of time that will be required to do the asbestos-abatement work in the building (days, weeks, etc.). If the building activity can be shut-down for this period, there is

no problem. Agreement is reached as to notification required, work scheduling, and coordination.

- (3) If a building activity is critical and shutdown/worker evacuation is not practical, several alternatives can be considered:
  - (a) If the building construction is favorable, the contractor can isolate one portion or room of the building at a time, and do work in that section, while normal activities continue in the remainder of the building. In this manner, the contractor can proceed successively through the building.
  - (b) The asbestos abatement work can be done over a weekend or extended holiday period when activity is routinely shut-down. If necessary, around-the-clock work can be scheduled.
  - (c) The contractor, in some cases (removal of pipe lagging), can use "glove bag" methods (see Section VII B1), as a technique for isolating the work area. This allows the abatement procedure to be performed within a very small workspace.

### 3. Work Area Sealing and Cleaning During Asbestos-Abatement Activities

It is necessary to seal off the area (room, attic, or building) where the asbestos-abatement work will be done. Depending upon the extent and complexity of the area affected, all or some of the following actions must be taken by the contractor:

- (1) Isolate electrical, heating, cooling, and ventilating air systems to prevent contamination and fiber dispersal to other areas of the structure. During the work, vents within the work area shall be sealed with tape and plastic sheeting.
- (2) Pre-clean movable objects and carpeting within the proposed work areas using HEPA filtered vacuum equipment and/or wet cleaning methods as appropriate and remove such objects from work areas to a temporary location.
- (3) Pre-clean fixed objects within the proposed work areas using HEPA-filtered vacuum equipment and/or wet cleaning methods as appropriate and enclose with minimum 4 mil plastic sheeting sealed with tape.
- (4) Clean the proposed work areas using HEPA filtered vacuum equipment or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, are not to be used.
- (5) Seal off all openings, including but not limited to corridors, doorways, windows, skylights, ducts, grills, diffusers, and any other penetrations into work areas, with plastic sheeting sealed with tape. Doorways and corridors that will not be used for passage during work should be sealed and temporarily barricaded.

- (6) Cover floor and wall surfaces with plastic sheeting sealed with tape. Use a minimum of two layers of 6 mil plastic on floors. Cover floors first so that plastic extends at least 12 inches (300 mm) up the walls. Next, cover walls with a minimum of 4 mil plastic sheeting to the floor level, thus overlapping the floor material by a minimum of 12 inches. If a horizontal length of pipe insulation is being removed, it is customary to hang plastic sheet "drapes" from ceiling to floor at a distance of approximately 10 feet from the pipe, and hang plastic sheet drapes at each end of the pipe length.
- (7) Build air locks at entrances to and exits from work areas.
- (8) Remove and clean ceiling mounted objects (lights and other items not previously sealed off) that interfere with asbestos abatement. Use localized water spraying and/or HEPA-filtered vacuum equipment during fixture removal to reduce fiber dispersal.
- (9) Maintain emergency and fire exits from the work areas or establish alternative exits satisfactory to fire officials.

The object of the above-listed steps is to isolate the asbestos-abatement work area. In some buildings where relatively minor pipe lagging removal is required, the contractor may choose to use "glove bag" methods (see Section VII B1), which will allow the avoidance of many of the sealing/cleaning steps described above.

#### 4. Worker Protection

Worker protection herein refers to protection of contractor-employed workers who are engaged in asbestos-abatement work. Many of the worker protection requirements stipulated are also applicable, however, to GDSCC personnel who must enter and work in asbestos-contaminated areas.

a. Medical Examinations. Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by the regulations. This examination is not required if adequate records show the employee has been examined as required by the regulations within the past year.

b. Medical Reports. Maintain complete and accurate records of employees' medical examinations for the period stipulated in the regulations and make records of the required medical examinations available for inspection by authorized enforcement representatives.

c. Employee Information and Training. Each employee who may be exposed to airborne asbestos shall be trained in accordance with Title 8, CAC 5208 (n) under the direction of a qualified industrial hygienist. The training program includes:

- (1) EPA and Cal/OSHA required and recommended work practices: (no smoking or drinking in work areas).

- (2) Respirator use, including proper fit (no beards, sideburns that interfere with face fit), maintenance (cleaning) and changing and disposal of filters/cartridges (See Appendix H).
- (3) Dress and undress sequence (respirator goes on first), how to adjust size of protective clothing, how to gross-clean protective clothing, how to undress (with respirator in place) and dispose of contaminated clothing.
- (4) Personal decontamination procedures, including washing respirator in shower.
- (5) Safety procedures including use of designated passageways and the decontamination facility, emergency routes and escape procedures, operating under the constraints of hazards of limited vision, limited hearing and movement restrictions due to protective clothing and respirators, and uncertain footing on wet materials and plastic sheet.
- (6) Job supervisor responsibility to plan for and provide adequate supplies of protective equipment (clothing and respirators) and training instruction procedures for: 1) new employees after job has commenced, 2) authorized visitors such as the EIC or Contracting Officer, and 3) air-monitoring technicians and regulatory agencies' inspection personnel.

d. Respiratory Equipment. Provide workers with personally issued and marked respiratory equipment approved by NIOSH and OSHA and suitable for the asbestos exposure level in the work area according to OSHA Standard 29 CFR 1910.1001. Where respirators with disposable filters are employed, provide sufficient filters for replacement as required by the worker or applicable regulation.

e. Visitors' Respirators. Provide authorized visitors with a maximum of three (3) suitable respirators, and new filters or cartridges per day whenever they are required to enter the work area.

f. Protective Clothing. Provide workers with sufficient sets of protective full body clothing. Such clothing shall consist of full body coveralls and headgear. Provide eye protection and hard hats as required by applicable safety regulations. Non-disposable type protective clothing and footwear shall be left in the Contaminated Equipment Room until the end of the asbestos-abatement work, at which time such items shall be disposed of as asbestos waste, or shall be thoroughly cleaned of all asbestos or asbestos-containing material. Disposable type protective clothing, headgear, and footwear may be provided. Workers shall be fully protected with respirators and protective clothing from the time of the first disturbance of asbestos-containing or contaminated materials prior to commencing actual asbestos abatement and until final clean-up is completed.



g. Gloves. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape. Provide cloth work clothes for wear under the disposable protective coveralls and foot coverings.

h. Visitors' Clothing. Provide authorized visitors with protective clothing as described.

i. Decontamination Facility. Provide a temporary unit (portable trailers) with a separate decontamination locker room, a shower room, and a clean locker room for personnel required to wear whole-body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. Vacuum and remove asbestos-contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area, and seal in impermeable bags or containers for disposal. Do not remove disposable protective clothing in the decontamination locker room. Remove cloth work-clothing in the decontamination room. Tag and bag cloth work-clothes for laundering and keep work shoes in the decontamination locker. Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Clean the asbestos-contaminated work clothing in accordance with the regulations.

j. Changing Clothing. Each worker and authorized visitor shall, upon entering the job site, remove street clothes in the clean change room and put on a respirator with new filters and clean protective clothing before entering the equipment room or the work area.

k. Personal Decontamination. Each worker and authorized visitor shall, each time he leaves the work area: remove gross contamination from clothing before leaving the work area; proceed to the equipment room and remove all clothing except respirators; still wearing the respirator, proceed, unclothed to the showers; clean the outside of the respirator with soap and water while showering; remove the respirator; thoroughly shampoo and wash themselves; remove filters and wet them and dispose of filters in the container provided for the purpose; and wash and rinse the inside of the respirator.

Following showering and drying off, each worker and authorized visitor shall proceed directly to the clean change room and dress in clean clothes at the end of each day's work, or before eating, smoking, or drinking. Before re-entering the work area from the clean change-room, each worker and authorized visitor shall put on a clean respirator with filters and shall dress in clean protective clothing. Those workers intending to re-wear contaminated protective clothing stored in the equipment room shall enter the equipment room wearing only respirators.

1. Storage and Disposal of Contaminated Clothing and Footwear.

Contaminated work footwear shall be stored in the equipment room when not in use in the work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out, using soap and water before removing from work area or from equipment and access area. Store contaminated protective clothing in the equipment room for reuse or place in receptacles for disposal with other asbestos-contaminated materials.

m. Handling of Waste Containers. Workers removing waste containers from the equipment decontamination enclosure shall enter the holding area from outside wearing a respirator and dressed in clean coveralls. No worker shall use this system as a means to leave or enter the washroom or work area.

n. Eating and Drinking. Workers shall not eat, drink, smoke, or chew gum or tobacco at the worksite, except in the established clean room.

o. Posting of Procedures. Provide and post, in the Equipment Room and the Clean Room, the decontamination and work procedures to be followed by workers, as described above.

p. Restricted Work. No employee should be assigned to tasks requiring the use of respirators if, based on his most recent examination, the examining physician determines that the employee will be unable to function normally wearing a respirator or that the safety or health of the employee or other employees will be impaired by his use of a respirator.

The worker protection steps listed on the previous pages are derived from EPA, Federal OSHA and Cal/OSHA regulations. It is obvious that asbestos exposure is considered very hazardous and it is a serious matter to knowingly expose workers to asbestos fibers without proper safety equipment and clothing.

5. Environmental Protection

a. Caution Signs. Provide caution signs at all approaches to asbestos control areas containing concentrations of airborne asbestos fibers. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris and other products contaminated with asbestos.

Caution sign: Vertical format conforming to Cal/OSHA regulations in Title 8, 5208 (h)(2), and minimum dimensions of 20 by 14 inches displaying the following legend in the lower panel:

<u>Legend</u>	<u>Notation</u>
Asbestos	1" Sans Serif Gothic or Block
Dust Hazard	3/4" Sans Serif Gothic or Block
Avoid Breathing Dust	1/4" Gothic
Wear Assigned Protective Equipment	1/4" Gothic
Do Not Remain in Area Unless Your Work Requires It	1/4" Gothic
Breathing Asbestos Dust May be Hazardous to Your Health	14 point Gothic

Spacing between lines shall be at least equal to the height of the upper of any two lines.

b. Caution Labels. Asbestos materials, scrap, waste, debris, bags, and other asbestos-contaminated materials shall be placed in double poly bags and labeled. Labels are to be of sufficient size to be clearly legible, displaying the following legend:

CAUTION  
CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

BREATHING ASBESTOS DUST MAY  
CAUSE SERIOUS BODILY HARM

c. Emissions From the Sealed Asbestos-Abatement Work Area. Air emissions from the sealed asbestos-abatement work area should pass through an approved HEPA filter. Filters should be of 99.97 percent efficiency for retaining fibers of 0.3  $\mu$ m or larger.

Waste water containing asbestos fibers (wetting agent run-off, contaminated shower water, etc.), should be controlled and not allowed to flow into facility drainage systems.

## 6. Transport/Disposal of Asbestos Material

The containerization (bags, drums), interim storage, transport, and final disposal of asbestos-containing material is strictly regulated. It is generally required that the following procedures be followed:

- (1) Asbestos material should be removed in small sections. Before beginning the next section, pack the material while still wet into

sealable plastic bags (6 mil minimum) and bagged in a second 6 mil sealable plastic bag. Mark bags with the following OSHA label:

DANGER  
CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST  
CANCER AND LUNG DISEASE  
HAZARD

- (2) The outside of all containers shall be cleaned (decontaminated) before leaving the work area.
- (3) All plastic sheeting, tape, cleaning material, clothing and all other disposable material or items used in the work area shall be packed into sealable plastic bags (6 mil minimum) and placed into a second sealable plastic bag (6 mil minimum) for transport. Mark the bags with the OSHA label prescribed by the OSHA regulations.
- (4) Transport the sealed bags in sealed drums or bins to the approved-waste-disposal site.
- (5) As an alternative to placing sealed bags in drums, the contractor may request approval of the use of approved "hazardous waste" truck-mounted containers. If properly used and approved, this technique is less expensive.
- (6) A Federal Uniform Hazardous Waste Manifest should be filled out for the waste shipment according to the directions on the manifest and a copy retained by the GDSCC.

7. Air Sampling and Analysis in Connection  
with Asbestos-Abatement Procedures

Air sampling and analysis for asbestos fibers is routinely done in connection with asbestos-abatement work. Requirements vary depending upon the project size, complexity, and potential exposure danger. As an example of air sampling/analysis requirements, the following is presented:

- (1) Monitoring of airborne concentrations of asbestos fibers shall be in accordance with applicable regulations.
- (2) Time-Weighted Average (TWA): Three samples are required to establish the 8-hour time-weighted average. The maximum TWA is an 8-hour time-weighted average airborne concentration of 0.2 (OSHA standard) fibers, longer than 5  $\mu$ m, per cubic centimeter of air.
- (3) Monitoring Prior to Asbestos Work: Provide work area monitoring and establish the initial asbestos level one day prior to the masking and sealing operations for each work area.

- (4) **Monitoring During Asbestos Work:** Air monitoring shall be performed to provide the following samples during the period of asbestos removal, encapsulation, etc.:

Area To Be Sampled	Minimum Number of Samples for Each 8-Hour Shift	Minimum Volume Each Sample (liters)
Work Area	2	120
Outside Work Area (within Building)	1	120
Outside Building	1	240

- (5) At least one worker in the asbestos work area shall be fitted with an approved air sampling device within his respiratory protection (worker breathing) zone. An 8-hour time-weighted average airborne concentration of 0.2 fibers, greater than 5  $\mu\text{m}$  in length, per cubic centimeter of air, is the permissible exposure limit for inside the asbestos control area.
- (6) **Monitoring After Asbestos Work is Completed:** Clean all surfaces in the work area with water and/or with a High Efficiency Particulate Absolute (HEPA) filtered vacuum (do not use compressed air). After cleaning the work area, wait 24 hours to allow for settlement of dust, and then wet clean all surfaces in the work area again. After completion of the second cleaning operation, perform a complete visual inspection of the work area to ensure that the work area is dust free. Take two air samples within 48 hours after completion of all cleaning work (Minimum volume of air sample is 1,000 liters).
- (a) When air samples taken from the work area indicate an asbestos content of less than 0.01 fibers per cubic centimeter, the project engineer may authorize the removal of the temporary partitioning. If the project engineer finds that the work area has not been decontaminated, repeat the cleaning and air monitoring until the work area is in compliance.
- (b) After the work area is found to be in compliance, all entrances and exits shall be unsealed and the plastic sheeting, tape and any other trash and debris disposed of in sealable plastic bags (6 mil minimum) as hazardous waste.
- (c) If at any time monitoring outside the asbestos work area shows airborne concentrations have reached the specified maximum TWA, stop all work, correct the condition(s) causing the increase, and notify the project engineer immediately.

- (d) The sampling and interpretation of airborne asbestos shall be directed by a qualified industrial hygienist and shall be performed in a manner that will assure an accurate determination of airborne asbestos concentrations. Sample analyses shall be performed by a qualified laboratory using the membrane filter method and phase contrast microscopy with 400 to 450X magnification and a 4 millimeter objective. Fiber counting shall be completed and results reviewed by the industrial hygienist within 24 hours. The industrial hygienist shall notify the contractor and the contracting officer immediately of any exposures to asbestos fibers in excess of the acceptable limits. Submit all monitoring results to the contracting officer within 3 working days.

#### 8. Recordkeeping Requirements

The Facility Asbestos Coordinator (FAC) shall maintain a recordkeeping system that includes the following:

- (1) The exact location of asbestos-abatement operations.
- (2) A chronology of abatement operations, including the date that work was begun, the date that work was ended, a visitors log, and any accidental or unforeseen occurrences.
- (3) The name and job description of the people performing removal of ACM.
- (4) A list of the personal protective equipment used.
- (5) Results of air sampling performed before, during, and after abatement operations.

## SECTION VIII

### ASBESTOS-MANAGEMENT PLAN

#### A. INTRODUCTION

The GDSCC does not have a written asbestos policy nor a structured asbestos management program. While not required by law, these are essential if compliance with environmental and health and safety regulations is to be achieved. The following management plan provides a basis from which the GDSCC can formulate an asbestos-management program. The program should include, at a minimum, written Standard Operating Procedures (SOPs) that cover:

- (1) Identification, inspection, and repair of ACM.
- (2) Caution signs and labels.
- (3) Employee protection and training.
- 2 (4) Housekeeping and waste disposal practices.
- (5) Medical surveillance and recordkeeping.
- (6) Reporting requirements.

Asbestos-management programs in the State of California are administered and regulated by the Department of Industrial Relations (Cal/OSHA) under title 8 of the California Administrative Code ( 8 CAC 5208) and by the Department of Health Services under Title 22 ( 22 CAC 6600). Control of asbestos emissions is regulated under rules established by the San Bernardino Air Pollution Control Board. In addition, Federal regulations governing the management of asbestos, administered by the EPA, can be found in 40 CFR 61. Department of Transportation regulations governing the transportation of asbestos and other hazardous materials/wastes are contained in 49 CFR 172. Procedures contained in the following management plan are derived from these state and Federal regulations.

#### B. STANDARD OPERATING PROCEDURES (SOPs)

Written SOPs are an essential part of an efficient and functional asbestos-management plan. Some SOP's are required by regulation. OSHA requires that if respirators are used in the workplace an employer must institute a respiratory protection program that includes written standard operating procedures for the proper use of the respirators (see Appendix H). Written SOPs should be developed for each of the following sections of the management plan.

C. IDENTIFICATION, INSPECTION, AND REPAIR OF ASBESTOS-CONTAINING MATERIALS (ACMs)

1. Asbestos-Containing Pipe Insulation

During an asbestos survey conducted in October and November 1986 at the GDSCC, the location of pipe insulation containing asbestos was identified. A list of those locations can be found in the GDSCC Safety Office and maintenance supervisor's office.

a. Inspection of Pipe Insulation. A plan and schedule for conducting inspections has been prepared. In accordance with that plan, all locations identified as having asbestos-containing pipe insulating materials shall be inspected at least twice a year and the findings reported to the GDSCC Asbestos Coordinator.

The inspection report shall include a statement of the condition of the asbestos-containing material (ACM):

- (1) If the pipe wrap is intact, no further action is needed.
- (2) If the wrap and insulation are damaged, they should be repaired or replaced as soon as possible.
  - (a) Minor damage to insulation materials and wrap shall be repaired.
  - (b) Extensive damage or deterioration of insulating materials or wrap shall be cause for removal of the ACM.
- (3) The determination of whether to repair or replace ACM shall be made by the Facility Asbestos Coordinator (FAC). Wet removal does not require EPA approval.

b. Inspection of Building Materials. All locations identified as having ACM shall be inspected at least twice a year and the findings reported to the FAC.

The inspection report shall include a statement of the condition of the ACM.

- (1) Damage to ACM should be dealt with as soon as possible.
- (2) Extensively damaged ACM shall be removed by a qualified contractor.
- (3) Minor damage to ACM shall be repaired.
- (4) The FAC shall make the determination as to the repair or replacement of ACM.



## 2. Repair, Removal, and Replacement of ACM

All procedures for the safe repair or removal of ACM are contained in Section VII, the Abatement Plan. Standard Operating Plans should be developed detailing procedures for the safe handling of asbestos.

### D. PROCEDURES AND OPTIONS FOR MANAGEMENT OF ASBESTOS IN ROOFS AND BOILERS AT THE GDSCC

The roofing and boiler-insulating materials that contain asbestos require periodic inspection to insure that the condition of the material has not deteriorated. When deterioration or damage is observed, repair of the damage should be performed immediately. If the damage warrants removal of the material, removal is required to be performed by qualified personnel.

Roofing material demolition is excepted from compliance with the requirements detailed in 29 CFR 1926.58(e)(6). All other requirements of the standard apply. For boiler insulation, all requirements of 29 CFR 1926.58 apply.

### E. CAUTION SIGNS AND LABELS

Cal/OSHA requires the use of caution signs and labels at places where employees may be exposed to asbestos. Caution signs must be displayed when airborne concentrations may exceed the permissible exposure limit. Signs shall read:

ASBESTOS

DUST HAZARD

AVOID BREATHING DUST

WEAR PROTECTIVE EQUIPMENT

DO NOT REMAIN IN AREA UNLESS YOUR WORK REQUIRES IT  
BREATHING ASBESTOS DUST MAY BE HAZARDOUS TO YOUR HEALTH

Labels must be affixed to all materials containing asbestos fibers and onto all bags and containers of asbestos waste. Labels shall read:

CAUTION

CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

BREATHING ASBESTOS MAY CAUSE SERIOUS BODILY HARM

### F. EMPLOYEE PROTECTION AND TRAINING

#### 1. Respiratory Protection (see Appendix H)

Respirators shall be used when working with ACM. The respirator approved for use is the North half-face respirator with HEPA filters.

OSHA requires that an employer institute a respiratory protection program if respirators are used. The requirements of this program are:

- (1) Written standard operating procedures.
- (2) Selection of respirator based on hazard type.
- (3) Instruction and training in proper use.
- (4) Fit-testing.
- (5) Regular cleaning and disinfection.
- (6) Clean and sanitary storage.
- (7) Inspection for worn or deteriorated parts.
- (8) Surveillance of work conditions and exposure levels.
- (9) Regular inspections to evaluate program.
- (10) An examination to verify that persons wearing respirators are physically able to wear their respirators.
- (11) Only NIOSH/MSHA (Mine Safety and Health Administration) approved respirators are used.

## 2. Employee Training

Regulations require that employees involved in the maintenance, repair, construction, renovation, demolition, salvage, or handling of asbestos-containing materials shall be trained at least annually in the following areas:

- (1) Nature of all health hazards attributable to asbestos.
- (2) The increased risk of lung cancer associated with cigarette smoking and asbestos exposures.
- (3) The specific locations and operations where exposure to asbestos may occur.
- (4) The purpose of and a description of the medical surveillance program (see Section G below).
- (5) The purpose of and a description of the monitoring program.
- (6) Methods used to protect employees from exposure.
- (7) Proper uses and limitations of respiratory protective equipment as defined in 8 CAC 5144.
- (8) Purpose, proper use, and limitations of protective clothing.

- (9) Housekeeping and personal hygiene practices used to prevent asbestos exposures.
- (10) Procedures involving spills or problems with personal protective equipment.

Documentation of employee training shall include a description of the training conducted, followed by the employee's name, employee social security number, job description and signature. A copy of this training documentation shall be placed in the employee's personnel file.

#### G. HOUSEKEEPING AND DISPOSAL PRACTICES

Good housekeeping and cleaning practices minimize worker exposure to asbestos. Written SOPs covering housekeeping, clean-up, and disposal of asbestos should state that:

- (1) All surfaces must be kept free of asbestos fibers.
- (2) Asbestos spills shall be cleaned up promptly.
- (3) HEPA vacuums and wet mops shall be used to clean up asbestos.
- (4) Containers must be properly labeled (see Section VII C6).
- (5) Asbestos waste and asbestos-contaminated bags and other containers must be disposed of as hazardous waste. These wastes must be sent to a landfill that is approved for the disposal of asbestos. Asbestos waste cannot be sent to the GDSCC Class III landfill.
- (6) ACM to be disposed of shall be placed in double poly bags and the bags shall be labeled as follows:

CAUTION  
CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

BREATHING ASBESTOS DUST MAY CAUSE  
SERIOUS BODILY HARM

#### H. MEDICAL SURVEILLANCE AND RECORD KEEPING

SOPs should be written describing employee medical examination requirements. Regulations require that all employees involved in the maintenance, repair, construction, renovation, demolition, salvage or handling of any ACM shall be included in the medical surveillance program. The program shall consist of the following:

- (1) A medical history to elicit symptomatology of upper and lower respiratory and gastrointestinal diseases.

- (2) A physical examination of the respiratory and gastrointestinal systems.
- (3) A 14 x 17 in. posterior-anterior chest x-ray and right and left oblique chest x-rays.
- (4) Pulmonary function tests including forced vital capacity (FVC) and forced expiratory volume (1 second) FEV.

Medical surveillance shall begin, and/or be repeated according to the following schedule:

- (1) Examinations shall begin within 30 calendar days of the employees initial assignment.
- (2) Employees shall be examined within 30 calendar days of termination of employment if an examination has not been performed within the year preceding termination.
- (3) The complete medical examination described above shall be repeated annually for all affected employees.
- (4) Medical examination records shall be maintained for at least 30 years.

#### J. REPORTING REQUIREMENTS

Regulations require employers to notify agencies when ACM is handled or removed. Prior to any maintenance, repair, construction, renovation, demolition, salvage, or handling of ACM, the Facilities Asbestos Coordinator shall notify and register as a carcinogen user. In short, the following information is requested:

- (1) Name and address of employer.
- (2) A brief description of how asbestos will be handled.
- (3) The number of employees potentially exposed.
- (4) A brief description of the work to be done.

If ACM is to be removed, Cal/OSHA must be notified in writing, or by a phone-call, at least 24 hours prior to the removal. The district office for notification is:

State of California  
Department of Industrial Relations  
Division of Occupational Safety & Health  
303 W. Third Street  
San Bernardino, CA 92401  
(714) 383-4321

In the event that more than 80 linear meters (260 linear feet) of ACM on pipes or 15 square meters (160 square feet) of friable asbestos are to be removed, the U.S. EPA must be notified. The office to contact is listed

below. The notification must be postmarked or delivered at least 10 days prior to the planned renovation or removal operation:

U.S. EPA  
Region IX  
215 Fremont St.  
San Francisco, CA 94105  
(415) 947-7648

## SECTION IX

### FUTURE PLANS FOR ASBESTOS ABATEMENT AND MANAGEMENT AT THE GDSCC

The first asbestos survey, involving approximately 100 buildings and structures at the GDSCC, was completed in late 1986. A report, dealing with the findings of this first asbestos survey, was submitted in April 1987.

The second asbestos survey, involving the roofs and boilers of 12 selected buildings at the GDSCC, was completed in September 1987. A report, dealing with the results of this second asbestos survey, was submitted in October 1987. This present document is a combination and integration of these two separate asbestos-survey reports.

Based upon 288 individual samples collected from 38 buildings and structures at the GDSCC, 103 occurrences of asbestos-containing materials (ACMs) were identified in 49 different uses of ACMs (pipe-lagging, roofing, interior walls, floor tiles, etc.).

Based upon 47 individual samples collected from the roofs and boilers of 12 selected buildings at the GDSCC, eight occurrences of ACMs were identified (5 in roofs and 3 in boilers).

Except for friable asbestos, which is found in all pipe lagging, most of the 111 asbestos occurrences involved non-friable ACMs, in which the asbestos fibers are bonded in a matrix (cement, organic resins, etc.) and do not release asbestos fibers unless damaged or disturbed. They will be monitored at intervals to make certain that their integrity remains intact.

Some of the 111 occurrences of asbestos, however, involve easily-crumbled friable asbestos that readily can release asbestos fibers into the environment.

A Preliminary Engineering Report has been prepared to determine how to best remove all friable asbestos from GDSCC installations.

Thus, the Goldstone Deep Space Communications Complex, a major NASA facility, has an asbestos-abatement plan that is due to start in FY 88 and that envisions the total elimination of friable asbestos from the GDSCC by Fiscal Year 1990.

## SECTION X

### BIBLIOGRAPHY

Dale L. Keyes and Bertram P. Price. Guidance for Controlling Friable Asbestos-Containing Materials in Buildings, Battelle Memorial Institute, Columbus Division, Washington, D.C., EPA 560/5-83-002, March 1983.

U.S. EPA. Interim Method for the Determination of Asbestos in Bulk Insulation Samples; EPA 600/M4-82-020; U. S. EPA Environmental Monitoring Systems Laboratory; Research Triangle Park, North Carolina 27711; December 1982.

U.S. EPA. Guidance for Controlling Friable Asbestos-Containing Materials in Buildings; EPA 560/5-83-002; U.S. EPA, Washington, D.C. 20460; March 1983.

U.S. EPA. Support Document for Proposed Rule on Friable Asbestos-Containing Materials in School Buildings, Health Effects and Magnitude of Exposure; EPA 560/12-80-003; U.S. EPA, Washington, D.C. 20460; October 1980.

U.S. EPA Regulations in 43 Federal Regulation (FR) 26372 and 47 FR 23360.

OSHA Regulations in 51 FR 119, pp. 22612-22790, June 20, 1986. Current Interim Emergency Standards.

CAL/OSHA Regulations in Title 8, 5208, pp. 442.1-3. August 13, 1985.

Publications issued by the National Asbestos Training Center, University of Kansas, Lawrence, Kansas.

SECTION XI

CERTIFICATION

I hereby certify that all work performed by M. B. Gilbert Associates, Long Beach, California, in its survey of asbestos-containing materials at the Goldstone Complex of the Ft. Irwin Military Reservation, San Bernardino County, California, as described in this report, was performed in compliance with Federal, state, and local regulations, and in accordance with good engineering and investigative practice.

Leonard H. Kushner  
Registered Professional Engineer

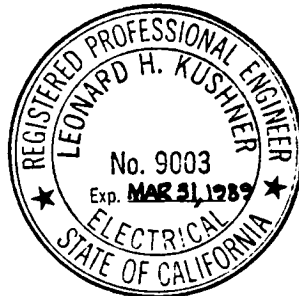
Signature Leonard H. Kushner

Date Signed: FEB 1, 1988

Registration No. E9003, Electrical  
SF1086, Safety

State: California  
California

Stamp/Seal:





## APPENDIX A

### TERMINOLOGY AND DEFINITIONS OF WORDS AND TERMS ASSOCIATED WITH ASBESTOS IN THE ENVIRONMENT

Abatement: Procedures, including encapsulation, enclosure, and removal, that are used to control fiber release from asbestos-containing building materials.

Airlock: A system for permitting ingress or egress without allowing air movement between a contaminated area and an uncontaminated area. It typically consists of two curtained doorways at least 6 feet apart.

Air Monitoring: A process to measure the asbestos fiber content of a specific volume of air in a stated period of time.

Amended Water: Water to which a surfactant has been added.

Area Monitoring: Sampling of asbestos fiber concentrations within the asbestos control area and outside the asbestos control area. This sampling represents the airborne concentrations of asbestos fibers that may reach the breathing zone.

Asbestos: Includes the minerals chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

Asbestos Material: Asbestos or any asbestos-containing material, including pipe and boiler insulation, roofing and siding insulation, fireproofing, or asbestos cement products.

Asbestos Control Area: An area where asbestos removal operations are being performed. It is isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris.

Asbestos Fibers: Refers to asbestos fibers longer than 5 micrometers ( $\mu\text{m}$ ).

Authorized Visitor: Any visitor to the site whose visit has been authorized by the Contracting Officer, and/or is a representative of a cognizant regulating agency that has jurisdiction over the project.

Clean Room: An uncontaminated area or room that is part of the worker decontamination enclosure system. It has provisions for storage of workers' street clothes and protective equipment.

Concealed Spaces: Spaces between a suspended ceiling and floor construction above, or between double walls or furred-in areas, (i.e., pipe and duct shafts, loft areas, attics bounded by drywall ceilings, etc.).

Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms. It is typically constructed by placing two overlapping sheets of plastic over an existing or temporarily framed doorway, securing each sheet along the top of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side. Two curtained doorways spaced a minimum of 6 feet apart form an airlock.

Decontamination Enclosure System: A series of connected rooms, with curtained doorways between any two adjacent rooms, for the decontamination of workers or of materials and equipment. A decontamination enclosure system always contains at least one airlock.

Dust-Free: All surfaces and crevices free of all visible dust.

Encapsulant (Sealant): A liquid that can be applied to asbestos-containing materials. It controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

Encapsulation: A process necessary to coat all spray- or trowel-applied asbestos-containing materials with an encapsulant to control the possible release of asbestos fibers into the ambient air.

Equipment Decontamination Enclosure System: A decontamination enclosure system for materials and equipment, typically consists of a designated portion of the work area, a washroom, a holding area, and an uncontaminated area.

Equipment Room: A contaminated area or room that is part of the worker decontamination enclosure system. It has provisions for storage of contaminated clothing and equipment.

Exposed: Open to view. A pipe run through a room and not covered by construction is exposed.

Finished Spaces: Spaces used for habitation or occupancy where rough surfaces are plastered, paneled, or otherwise treated to provide a pleasing appearance.

Fixed Object: A unit of equipment or furniture in the work area that cannot be removed from the work area.

Friable Asbestos Material: Material that contains more than one percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

HEPA Filter: A high efficiency particulate air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be 99.97 percent efficient for retaining fibers of 0.3  $\mu\text{m}$  or larger.

Holding Area: A chamber between an uncontaminated area and the washroom in the equipment decontamination facility. The holding area comprises an airlock.

Jacketing: The outer covering of insulation material used on boilers and steam vessels. The term commonly is used to mean both the outer covering and the insulating material itself.

Lagging: The outer covering of insulating materials used on steam and hot water pipes. It may be cloth, metal or paper. The term commonly is used to mean both the outer covering and the insulating material itself.

Movable Object: A unit of equipment or furniture in the work area that can be removed from the work area.

Negative Pressure: A local exhaust system capable of maintaining a minimum pressure differential of minus 0.02 inch of water column relative to adjacent unsealed areas.

Non-Friable Asbestos Material: Material that contains asbestos in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and during any appropriate use will not release fibers in excess of the asbestos control limit.

Permissible Exposure Limit (PEL): The 8-hour time-weighted average concentration of airborne asbestos fibers to which any employee may be exposed shall not exceed 0.2 fibers, longer than 5 micrometers, per cubic centimeter of air as determined by the membrane filter method using phase contrast illumination and 400 X to 450 X magnification.

Personal Monitoring: Air sampling of asbestos fiber concentrations within the breathing zone of an employee.

Qualified Industrial Hygienist: An industrial hygienist who is experienced in asbestos-abatement procedures and who works under the direct supervision of an industrial hygienist certified by the American Board of Industrial Hygiene (ABIH).

Qualified Laboratory: A laboratory that has been judged proficient in the counting of asbestos fibers by successful participation in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program.

Removal: All removal procedures strip all asbestos-containing materials from the designated areas and dispose of these materials at an acceptable site.

Shower Room: A room between the clean room and the equipment room in the worker decontamination facility. It has hot and cold or warm running water and is suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.

Surfactant: A chemical wetting agent added to water to improve penetration. This reduces the quantity of water required to sufficiently moisten asbestos material for its removal.

Time-Weighted Average(TWA): The TWA is an 8-hour time-weighted average airborne concentration of fibers per cubic centimeter of air. The measurement involves fibers that are longer than 5 micrometers.

Transite: A cementitious, non-friable, asbestos-cement material commonly used for building sidings, walls, panels, etc., as well as water-distribution pipelines.

Washroom: A room between the work area and the holding area in the equipment decontamination enclosure system. The washroom comprises an airlock.

Wet Cleaning: A process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools that have been dampened with water. These cleaning tools are disposed of afterwards as asbestos-contaminated waste. Streaking caused by wiping down is not acceptable.

Work Area: Area or room where asbestos material is present including the ceilings, walls, floors, fixed items, etc.

Worker Decontamination Enclosure System: A decontamination enclosure system for workers, typically consisting of a clean room, a shower room, and an equipment room.

**APPENDIX B**

**BUILDING-BY-BUILDING SAMPLE RESULTS  
OF ASBESTOS SURVEY AT THE GDSCC/BARSTOW**

Table B-1. Laboratory Results by Building Number

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
PIONEER SITE			
G-6	NO SAMPLES		
G-7	NO SAMPLES		
G-12	NO SAMPLES		
ECHO SITE			
G-21	MB1031G21-AB	ND <sup>a</sup>	ND
	MB1031G21-AC	20	ND
	MB1031G21-AD	1	ND
	MB1031G21-AE	35	ND
	MB1031G21-AEA <sup>b</sup>	25	ND
	MB1031G21-AF	ND	ND
	MB1031G21-AG	20	25
	MB1031G21-AH	ND	ND
	MB0922G21-29	ND	ND
	MB0922G21-30	ND	ND
G-22	MB1029G22-AA	ND	ND
	MB1029G22-EA	ND	ND
G-23	MB1031G23-AA	ND	ND
	MB1031G23-AB	ND	ND
	MB1031G23-ABA <sup>b</sup>	ND	ND
	MB1031G23-AC	ND	ND
	MB1031G23-AD	20	ND
	MB1031G23-ADA <sup>b</sup>	15	2
	MB1031G23-AE	ND	ND
	MB1031G23-AF	20	5
	MB1031G23-AG	ND	ND
	MB1031G23-AH	ND	ND
	MB1031G23-AI	45	ND
	MB1031G23-AJ	ND	ND
	MB1031G23-AK	15	10
	MB1031G23-AL	10	30
	MB1031G23-AM	40	ND
	MB1031G23-AMA <sup>b</sup>	45	ND
	MB1031G23-BA	ND	ND

<sup>a</sup>ND means no asbestos was detected in the sample. The detection limit is 1% asbestos.

<sup>b</sup>These samples are replicate samples. Replicate samples have identical sample numbers, except that the letter "A" has been added to the end of the identifying number of one of the replicate samples.

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
ECHO SITE (Cont'd)			
	MB1031G23-EA	ND	ND
	MB1031G23-GA	5	ND
	MB0917G23-7	ND	ND
	MB0917G23-8	ND	ND
	MB0922G23-27	ND	ND
	MB0922G23-28	ND	ND
G-24	MB0930G24-HA	ND	ND
	MB0930G24-HB	35	ND
	MB0930G24-HC	ND	ND
	MB0930G24-HD	60	ND
	MB0930G24-HE	25	ND
	MB0930G24-HF	ND	ND
	MB1001G24-HG	20	ND
	MB1001G24-HH	30	ND
	MB1001G24-HI	25	ND
	MB0930G24-GA	2	ND
	MB0930G24-GB	2	ND
	MB1001G24-BA	ND	ND
	MB1001G24-BB	ND	ND
	MB1009G24-CC	ND	ND
	MB1001G24-EA	ND	ND
G-25	MB1001G25-GA	ND	ND
	MB1001G25-EA	ND	ND
G-26	RB1010G26-AA	20	5
	RB1010G26-AB	ND	ND
	RB1010G26-AC	15	10
	RB1010G26-AD	ND	ND
	RB1010G26-AE	30	ND
	RB1010G26-AF	ND	ND
	RB1010G26-AG	15	ND
	RB1010G26-AH	ND	ND
	RB1010G26-AI	ND	ND
	RB1010G26-AJ	20	2
	RB1010G26-AK	ND	ND
	RB1010G26-AL	20	5
	RB1010G26-AM	ND	ND
	MB1009G26-CA	ND	ND
	MB1009G26-CAAb	ND	ND
	MB1009G26-CB	ND	ND
	MB1009G26-CBAAb	ND	ND
	RB1010G26-DA	ND	ND
	RB1010G26-DAAAb	ND	ND



Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
ECHO SITE (Cont'd)			
	MB1009G26-EA	ND	ND
	MB1009G26-EB	ND	ND
	MB1009G26-GA	ND	ND
	MB1009G26-GB	3	ND
	MB1009G26-GBA <sup>b</sup>	3	ND
	MB1009G26-GC	5	ND
	MB1009G26-GD	<1 <sup>c</sup>	ND
	MB1009G26-HA	ND	ND
	RB1010G26-HB	2	ND
	RB1010G26-HD	30	ND
	MB1010G26-HE	35	ND
	MB1010G26-HEA <sup>b</sup>	30	ND
	MB0917G26-15	<1	ND
	MB0917G26-16	<1	ND
	MB0917G26-17	ND	ND
	MB0917G26-18	5	ND
	MB0922G26-31	ND	5
	MB0922G26-32	ND	ND
	MB0922G26-33	ND	ND
	MB0922G26-33A <sup>b</sup>	ND	ND
	MB0922G26-34	ND	ND
G-27	MB1001G27-EA	ND	ND
	MB0507G27-AA	<1	ND
G-28	MB1001G28-GA	ND	ND
	MB1001G28-CA	ND	ND
G-29	MB0930G29-CA	ND	ND
G-33	MB1031G33-AA	ND	ND
	MB1031G33-AF	ND	ND
	MB1031G33-AG	30	ND
	MB1031G33-AH	ND	ND
	MB1031G33-AI	ND	ND
	MB0508G33-AJ	ND	ND
	MB0508G33-AK	20	ND
	MB0508G33-AL	15	ND
	MB0508G33-AM	ND	ND
	MB0508G33-AMA <sup>b</sup>	ND	ND
	MB0508G33-AN	20	5
	MB0508G33-AO	ND	ND

<sup>c</sup>The symbol <1 indicates trace amounts of asbestos. Less than 1% of asbestos are in these samples.

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
ECHO SITE (Cont'd)			
	MB0508G33-AP	25	15
	MB0508G33-AQ	ND	ND
	MB0508G33-AR	25	15
	MB0508G33-AS	ND	ND
	MB0508G33-AT	20	ND
	MB1010G33-EA	ND	ND
	MB1010G33-EB	ND	ND
	MB1010G33-EBA <sup>b</sup>	ND	ND
	MB1010G33-EC	ND	ND
	MB1010G33-GB	2	ND
	MB1010G33-GC	1	ND
	MB1010G33-GD	2	ND
	MB1010G33-GE	3	ND
	MB0917G33-12	ND	ND
	MB0917G33-13	ND	ND
	MB0917G33-14	ND	ND
	MB0922G33-35	ND	ND
	MB0922G33-36	ND	ND
	MB0922G33-37	ND	ND
	MB0922G33-38	ND	ND
	MB0922G33-39	ND	ND
	MB0922G33-40	ND	ND
G-34	MB1031G34-BA	ND	ND
	MB1031G34-EA	ND	ND
G-35	NO SAMPLES		
G-36	MB1031G36-GA	1	ND
G-37	MB1031G37-AC	30	ND
	MB1031G37-AD	40	ND
	MB1029G37-BA	ND	ND
	MB1029G37-EA	ND	ND
	MB1029G37-GA	10	ND
	MB1029G37-HB	ND	ND
G-38	MB1031G38-AA	ND	ND
	MB1031G38-AB	10	ND
	MB1031G38-AC	ND	ND
	MB1031G38-ACA <sup>b</sup>	ND	ND
	MB1031G38-AD	ND	ND
	MB1031G38-AE	ND	ND
	MB1031G38-AF	10	15
	MB0507G38-AF	ND	ND

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
ECHO SITE (Cont'd)			
	MB0507G38-AG	25	10
	MB0507G38-AH	20	ND
	MB0507G38-AI	25	15
	MB0507G38-AIA <sup>b</sup>	15	5
	MB0507G38-AJ	15	ND
	MB0930G38-HA	50	ND
	MB0928G38-HB	<1	5
	MB0928G38-HC	20	<1
	MB0917G38-9	ND	ND
	MB0917G38-10	ND	ND
	MB0917G38-11	<1	ND
	MB0922G38-25	ND	5
	MB0922G38-26	ND	ND
G-39	NO SAMPLES		
G-40	NO SAMPLES		
G-41	MB0930G41-CA	ND	ND
	MB0930G41-CB	ND	ND
G-42	MB0930G42-EA	ND	ND
	MB0930G42-CA	ND	ND
	MB0930G42-CB	ND	ND
	MB0930G42-GA	3	ND
	MB0930G42-GB	2	ND
	MB0930G42-GC	2	ND
G-43	MB1029G43-BA	ND	ND
	MB1029G43-CA	ND	ND
	MB1029G43-CAA <sup>b</sup>	ND	ND
	MB1029G43-EA	ND	ND
	MB1029G43-GA	ND	ND
G-44	MB0930G44-CA	25	ND
G-45	MB0930G45-EA	ND	ND
	MB0930G45-EB	ND	ND
	MB0930G45-GA	2	ND
G-46	MB0929STOR1-CA	ND	ND
	MB0929G46-GA	ND	ND
	MB0929G46-HA	25	ND
	MB0929G46-HB	75	ND
	MB0929G46-CA	ND	ND
	MB0929G46-HC	20	ND

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
ECHO SITE (Cont'd)			
G-47	MB0930G47-DA	ND	ND
	MB0930G47-GA	<1	ND
	MB0930G47-EA	ND	ND
G-48	NO SAMPLES		
DUMPSITE	MB1031ECHO-HA	ND	ND
	MB1031ECHO-HB	ND	ND
	MB1031ECHO-HC	ND	ND
VENUS SITE			
G-51	MB1028G51-AA	ND	ND
	MB1028G51-AB	5	2
	MB1028G51-AC	ND	ND
	MB1028G51-AD	20	5
	MB1028G51-AE	10	25
	MB1028G51-AF	60	ND
	MB1028G51-CA	15	5
	MB1028G51-CB	ND	ND
	MB1028G51-CBA <sup>b</sup>	ND	ND
	MB1028G51-GA	5	ND
	MB1028G51-HA	ND	ND
	MB0917G51-1	ND	ND
	MB0917G51-2	ND	ND
	MB0922G51-41	ND	ND
	MB0922G51-42	ND	ND
G-52	MB1028G52-CA	ND	ND
G-53A	MB1028G53A-GA	5	ND
G-53B	MB0917G53B-6	ND	ND
G-54	NO SAMPLES		
G-55	MB1028G55-HA	30	ND
	MB1028G55-HB	ND	ND
	MB1028G55-HC	ND	ND
G-56	MB1028G56-GA	5	ND
G-57	NO SAMPLES		

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
VENUS SITE (Cont'd)			
G-58	MB0508G58-AA	2	ND
	MB0917G58-5	ND	ND
G-60	MB1028G60-EA	ND	ND
	MB1028G60-GA	ND	ND
	MB0917G60-3	ND	ND
	MB0917G60-4	ND	ND
G-61	NO SAMPLES		
G-63	MB1027G63-CA	ND	ND
	MB1027G63-CAA <sup>b</sup>	ND	ND
G-67	NO SAMPLES		
AIRPORT SITE			
G-69	NO SAMPLES		
G-70	MB1027G70-BA	5	ND
	MB0127G70-BAA	ND	ND
	MB1027G70-CA	ND	ND
G-71	MB1027G71-GA	10	ND
	MB1027G71-GB	ND	ND
MICROWAVE TEST FACILITY			
G-72	MB1027G72-AA	ND	ND
	MB1027G72-AB	15	15
	MB1027G72-ABA <sup>b</sup>	20	10
	MB1027G72-AC	ND	ND
	MB1027G72-AD	ND	ND
	MB1072G72-ADA <sup>b</sup>	ND	ND
	MB1027G72-AE	20	5
	MB1027G72-AF	50	ND
	MB1027G72-AFA <sup>b</sup>	40	ND
	MB1027G72-AG	ND	ND
	MB1027G72-AH	15	<1
	MB1027G72-AI	ND	ND
	MB1027G72-AJ	15	5
	MB1027G72-AJA <sup>b</sup>	40	2
	MB1027G72-DA	ND	ND

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
MICROWAVE TEST FACILITY (Cont'd)			
	MB1027G72-EA	ND	ND
	MB1027G72-EAA <sup>b</sup>	2	ND
	MB1027G72-EB	ND	ND
	MB1027G72-GB	5	ND
	MB1027G72-GC	3	ND
	MB1027G72-GD	5	ND
	MB1027G72-HA	ND	ND
	MB0918G72-19	ND	ND
	MB0918G72-20	<1	ND
	MB0922G72-43	ND	5
	MB0922G72-44	ND	ND
	MB0922G72-44A*	ND	ND
MARS SITE			
G-80	MB1002G80-BA	<1	<1
	MB1002G80-CA	ND	ND
	MB1002G80-CB	ND	ND
	MB1002G80-CC	ND	ND
	MB1002G80-CCA <sup>b</sup>	ND	ND
	MB1002G80-CE	ND	ND
	MB1002G80-CF	ND	ND
	MB1002G80-CFA <sup>b</sup>	<1	<1
	MB1002G80-CG	<1	<1
	MB1002G80-CH	<1	<1
	MB1002G80-EA	ND	ND
	MB1002G80-EB	ND	ND
	MB1002G80-AA	ND	ND
	MB1002G80-GA	2	ND
	MB1002G80-GAA <sup>b</sup>	ND	ND
	MB1002G80-GB	ND	ND
	MB1002G80-GC	5	ND
	MB1002G80-GD	2	ND
	MB1002G80-GDA <sup>b</sup>	2	ND
	MB1002G80-HA	40	ND
	MB1002G80-HB	ND	ND
	MB1002G80-HC	ND	ND
	MB1002G80-HD	<1	<1
G-81	MB1003G81-CA	ND	ND
	MB1003G81-HA	ND	ND
	MB1003G81-HB	ND	ND
	MB1003G81-HC	ND	ND
	MB1003G81-HD	ND	ND

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
MARS SITE (Cont'd)			
	MB1003G81-GA	ND	ND
	MB0918G81-21	ND	ND
	MB0918G81-22	5	ND
G-82	NO SAMPLES		
G-83	NO SAMPLES		
G-84	MB1003G84-EA	ND	ND
	MB1003G84-EB	ND	ND
	MB1003G84-CA	ND	ND
	MB1003G84-CAA <sup>b</sup>	VOID <sup>d</sup>	
G-85	NO SAMPLES		
G-86	MB1003G86-AA	ND	20
	MB1003G86-AB	ND	35
	MB1003G86-AC	ND	25
	MB1003G86-AD	15	ND
	MB1008G86-EA	ND	ND
	MB1003G86-EA	ND	ND
	MB1003G86-EAA <sup>b</sup>	ND	ND
	MB1008G86-EB	ND	ND
	MB1008G86-EC	ND	ND
	MB1008G86-ED	ND	ND
	MB1008G86-GA	2	ND
	MB1003G86-HA	15	ND
	MB1003G86-HB	30	ND
	MB0918G86-23	2	ND
	MB0198G86-24	ND	ND
	MB1003G86-25	ND	25
G-87	MB1003G87-EA	ND	ND
G-88	NO SAMPLES		
G-89	NO SAMPLES		
G-90	NO SAMPLES		
G-91	MB1003G91-EA	ND	ND
	MB1003G91-EAA <sup>b</sup>	VOID <sup>d</sup>	

<sup>d</sup>VOID means the sample was destroyed in shipment to the analytical laboratory.

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
MARS SITE (Cont'd)			
G-94	NO SAMPLES		
G-95	NO SAMPLES		
MISCELLANEOUS			
G-92	MB1003G92-CA	ND	ND
G-100	NO SAMPLES		
BARSTOW SITE	MB1029BSTW-CD	ND	ND
	MB1029BSTW-EA	ND	ND
	MB1029BSTW-EB	ND	ND
	MB1029BSTW-EC	ND	ND
	MB1029BSTW-GA	30	ND
	MB1029BSTW-GB	2	ND
	MB1029BSTW-GC	ND	ND
	MB1029BSTW-2	ND	ND
	MB1029BSTW-2A	ND	ND
	MB1029BSTW-3	ND	ND
	MB1029BSTW-1	ND	ND
APOLLO SITE			
A-1	NO SAMPLES		
A-2	MB1008A2-AA	ND	ND
	MB1008A2-AB	ND	ND
	MB1008A2-EA	ND	ND
	MB1008A2-EB	ND	ND
	MB1009A2-EA	ND	ND
	MB1009A2-EB	ND	ND
	MB1009A2-EC	ND	ND
	MB1009A2-ED	ND	ND
	MB1009A2-HA	ND	ND
	MB1009A2-HAA <sup>b</sup>	ND	ND
	MB1009A2-GA	2	ND
	MB1009A2-GB	5	ND
	MB1009A2-GC	2	ND
A-3	NO SAMPLES		
A-4	MB1027A4-AA	ND	ND



Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
APOLLO SITE (Cont'd)			
A-5	MB1003A5-HA	60	ND
	MB1003A5-HB	40	ND
A-6	NO SAMPLES		
A-7	MB1008A7-CA	ND	<1
A-8	MB1008A8-BA	30	ND
	MB1008A8-BAA <sup>b</sup>	25	ND
A-12	MB1003A12-HA	ND	ND
A-85	MB1008A83-CA	ND	ND
A-86	NO SAMPLES		
A-87	MB1008A87-HA	ND	ND
A-88	NO SAMPLES		
MOJAVE BASE SITE			
M-1	RB1007M1-GA	ND	ND
	RB1007M1-GB	2	ND
	RB1007M1-GC	<1	ND
	RB1007M1-EA	ND	ND
M-2	RB1007M2-GA	3	ND
	RB1007M2-GB	<1	ND
	RB1007M2-CA	ND	ND
M-3	NO SAMPLES		
M-4	NO SAMPLES		
M-5	NO SAMPLES		
M-6	RB1007M6-GA	2	ND
	RB1007M6-BA	15	ND
	RB1007M6-AA	10	ND
M-7	NO SAMPLES		
M-8	RB1007M8-HA	15	ND
	RB1007M8-HB	ND	ND
	RB1007M8-HC	<1	ND
	RB1007M8-EA	ND	ND

Table B-1. (Cont'd)

Building Number	Sample Number	% Asbestos	
		Chrysotile	Amosite
MOJAVE BASE SITE (Cont'd)			
	RB1007M8-EB	ND	ND
	RB1007M8-EC	ND	ND
	RB1007M8-GA	ND	ND
	RB1007M8-GB	2	ND
M-9	RB1007M9-HA	35	ND
	RB1007M9-GA	2	ND
	RB1007M9-BA	ND	ND
	RB1007M9-BB	ND	ND
M-10	NO SAMPLES		
M-12	NO SAMPLES		
M-13	NO SAMPLES		
M-17	NO SAMPLES		
M-50	NO SAMPLES		
DUMPSITE	MB1030MOJAVE-HA	<1	<1
	MB1030MOJAVE-HB	<1	<1
	MB1030MOJAVE-HC	<1	<1

APPENDIX C

PROTOCOL USED TO CONDUCT THE FIELD SURVEY FOR ASBESTOS  
AT THE GDSCC

This is a detailed account of the protocol used to conduct the asbestos field surveys for both buildings/structures and roofs and boilers at the GDSCC. A more generalized account is presented in Section VI of this report.

Every effort should be made to conduct field survey inspections with minimum disruption to existing and ongoing GDSCC operations. This may require that certain buildings and areas be inspected during "minimum" work days or off-hours. Selection of such buildings and areas for off-hours inspections will be made by the Field Coordinator.

The Field Team should inspect all building structures, inside and out, for the presence of asbestos-containing materials. It also should inspect all areas of roofing and boiler-insulation materials as directed for each building for the presence of asbestos-containing materials. Such materials will be further identified as friable or non-friable. The Field Team will exclude mention of those materials that are recognized with a 100% certainty as being non-asbestos-containing materials. Those materials suspected of containing asbestos will be:

- (1) Sampled for asbestos identification, or
- (2) Not sampled if the material can be compared to material in a nearby building. This comparison should be made with 100% confidence in the match of the suspect asbestos-containing material to the "specimen" sampled in the nearby building.

The Field Team will be responsible for the determination of approximate dimensions of asbestos materials, such as lengths, widths, and thicknesses. In some cases, building dimensions will be obtained using drawings from the Directory of Goldstone Buildings and Facilities.

The Field Team will be responsible for providing drawings and/or diagrams that illustrate the general placement of asbestos-containing materials within a building area. Guidelines for preparing drawings and diagrams are attached to this protocol.

Asbestos-insulated below-grade structures, without access (piping), are not included as part of the survey. Lines in tunnels or vaults that are uncovered or covered (with removable covers), however, will be surveyed.

The Field Coordinator will supply the Field Team with a daily work schedule. This schedule will be sufficiently flexible to allow alternative building inspections when and where primary building selections are not accessible.

The Field Team will be provided keys or other means of access to building areas by the Field Coordinator. For example, where access requires specialized equipment, such as a tall ladder, the Field Coordinator will make the necessary arrangements for the inspection personnel.

PRECEDING PAGE BLANK NOT FILMED

There are nine (9) field survey forms that will be used in the collection of asbestos data. An additional "Key to Field Survey Forms Terms" will be used in completing the field survey forms. These forms are listed below and are provided as attachments to this document.

- FF 2685-1 - "General Building Information."
- FF 2685-2 - "Steam Lines."
- FF 2685-3 - "External Siding/Roof Material."
- FF 2685-4 - "Wall Structures/Partitions."
- FF 2685-5 - "Plenum/Attic/Crawl Spaces."
- FF 2685-6 - "Ceiling/Ceiling Structures."
- FF 2685-7 - "Steam Vessels."
- FF 2685-8 - "Flooring Materials."
- FF 2685-0 - "Key to Field Survey Forms Terms."

It is important that the information contained in the "Key to Field Survey Forms Terms" is understood. While most terms and their respective variable responses are self-explanatory, a brief comment will be made on each of the 12 terms found on the "Key" Sheet.

- (1) Description of activity: The variable responses refer to the routine use of each building or location where asbestos-containing materials are found.
- (2) Ventilation type: The objective of obtaining this information is to assess the extent of potential asbestos exposure, should there be a local release of asbestos materials.
- (3) Accessibility to area: The objective of obtaining this information is to give an asbestos-removal contractor some idea of how difficult asbestos removal will be. This information will be translated into costs for asbestos removal.
- (4) Work population in area (estimate): This refers to the number of individuals routinely assigned to the asbestos-containing area. This information permits an assessment of the (1) number of potentially exposed individuals and (2) the degree of imposition to work operations during an asbestos-removal project.
- (5) Condition of asbestos-containing material: This information is useful in determining the degree and type of asbestos abatement needed.
- (6) Coatings/Encapsulants/Covering Types: This information is useful in assessing the likelihood of asbestos release to work areas under normal conditions, and what factors should be considered in designing an asbestos-abatement program.
- (7) Obstruction to asbestos area: This provides additional information to an asbestos-removal contractor when the estimated cost of asbestos-removal is determined.

- (8) Opportunities for physical disturbances: These are specific and local phenomena that could result in the deterioration/or release of asbestos to the environment.
- (9) Presence of sensitive equipment: This provides the contractor and the GDSCC with data related to protecting and working around equipment that may be easily damaged.
- (10) Suggested (or recommended) asbestos-abatement time frame(s): The Field Team has an opportunity to suggest to the Field Coordinator the degree of urgency for some form of asbestos abatement. There is a "comment" space that allows the Field Team to justify its suggestion. The Field Coordinator will evaluate this suggestion and determine the need to formally recommend abatement.
- (11) Suggested (or Recommended) type of asbestos-abatement procedure: The Field Team has an opportunity to suggest to the Field Coordinator the type of asbestos abatement called for in a given situation. The Field Coordinator will evaluate this suggestion and determine the need to formally recommend a specific type of abatement.
- (12) Suggested (or Recommended) airborne asbestos monitoring consideration: The Field Team has an opportunity to suggest to the Field Coordinator the need and urgency for evaluating airborne asbestos exposures associated with a specific form and location of asbestos.

FF 2685-1

Building No. \_\_\_\_\_  
Page Series \_\_\_\_\_ to \_\_\_\_\_

Page No. \_\_\_\_\_  
Survey Date \_\_\_\_\_

GENERAL BUILDING INFORMATION

Inspector(s) \_\_\_\_\_

\_\_\_\_\_  
(Initials)

Administrative Officer \_\_\_\_\_

Map Grid \_\_\_\_\_ Construction Date \_\_\_\_\_

Construction Notes (Changes) \_\_\_\_\_

Building Type: (a) Frame (b) Cement/cement block (c) Stucco (d) Butler  
(e) Quonset (f) Other (describe) \_\_\_\_\_

No. of Floors \_\_\_\_\_

Estimated Building Area (SF) \_\_\_\_\_

Description of Building Activities (1) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*\*\*Site Restoration Complete: \_\_\_\_\_  
Signature of Goldstone \_\_\_\_\_ Date \_\_\_\_\_  
Representative

=====

Summary of Asbestos Uses:

- (a) Ceilings (b) Floors (c) Walls (d) Steam Lines (interior)  
(e) Steam Lines (exterior) (f) Steam vessels (interior)  
(g) Steam Vessels (exterior) (h) Plenum/attic/crawl spaces  
(i) Roofing (j) Exterior siding

Comments:

## STEAM LINES

	A	B	C	D	E
Location of Pipe (See Figure__)					
(a) Interior (b) Exterior					
(c) Abv gnd (d) Below grade					
(e) Horiz. @ ground level					
(f) Horiz. @ ceiling level					
(g) Vertical					
Pipe Dia. w/Lagging (in.)					
Thickness of Lagging (in.)					
Approx. Pipe Length (ft)					
Calc. Lagging Volume (CF)					
Cond. of Lagging Mat'l (1)					
Coatings/Coverings (2)					
Descript of Activities (3)					
Work Population (4)					
Ventilation (5)					
Accessibility (6)					
Obstructions to Area (7)					
Physical Disturbances (8)					
Sensitive Equipment (9)					
Specimen Number					
Sample Number					
Laboratory Result					
Sug. Abate. Timing (10)					
Sug. Abate. Method (11)					
Sug. Airborne Monitor. (12)					
Photo Log (Roll/Frame)					

Comments: \_\_\_\_\_



EXTERNAL SIDING/ROOF MATERIAL

	A	B	C	D	E
Location of Siding/roofing (See Figure _____)					
External Siding or Roofing					
Friable/Non-friable (F/NF)					
Surface Area Asbestos (SF)					
Thickness Asbestos (in.)					
Calc. Volume Asbestos (CF)					
Cond. of Asbestos Mat'l (1)					
Coatings (2)					
Work Population (4)					
Ventilation (5)					
Accessibility (6)					
Obstructions to Area (7)					
Physical Disturbances (8)					
Sensitive Equipment (9)					
Sug. Abate. Timing (10)					
Sug. Abate. Method (11)					
Sug. Airborne Monitor. (12)					
Photo Log (Roll/Frame)					
Comments: _____					

WALL STRUCTURES/PARTITIONS

	A	B	C	D	E
Location of Asbestos (See Figure _____)					
Wall Structure or Partition					
Friable/Non-friable (F/NF)					
Surface Area Asbestos (SF)					
Thickness Asbestos (in.)					
Calc. Volume Asbestos (CF)					
Cond. of Asbestos Mat'l (1)					
Coatings (2)					
Descript. of Activity (3)					
Work Population (4)					
Ventilation (5)					
Accessibility (6)					
Obstructions to Area (7)					
Physical Disturbances (8)					
Sensitive Equipment (9)					
Sug. Abate. Timing (10)					
Sug. Abate. Method (11)					
Sug. Airborne Monitor. (12)					
Specimen Number					
Sample Number					
Laboratory Results					
Photo Log (Roll/Frame)					
Comments: _____					

PLENUM/ATTIC/CRAWL SPACES	A	B	C	D	E
Location of Asbestos (See Figure _____)					
Plenum/Attic/Crawl Space					
(a) Friable (b) Non-Friable					
(c) Troweled (d) Blanket					
(e) Beams/Truss (f) SPI					
(f) Equipment:					
(g) Other:					
Surface Area Asbestos (SF)					
Thickness Asbestos (in.)					
Calc. Volume Asbestos (CF)					
Cond. of Asbestos Mat'l (1)					
Coatings (2)					
Descript. of Activity (3)					
Work Population (4)					
Ventilation (5)					
Accessibility (6)					
Obstructions to Area (7)					
Physical Disturbances (8)					
Sensitive Equipment (9)					
Sug. Abate. Timing (10)					
Sug. Abate. Method (11)					
Sug. Airborne Monitor. (12)					
Specimen Number					
Sample Number					
Laboratory Results					
Photo Log (Roll/Frame)					

Comments: \_\_\_\_\_

CEILINGS/CEILING STRUCTURES	A	B	C	D	E
Location of Asbestos (See Figure _____)					
(a) Friable (b) Non-Friable					
(a) Paneling: fastened					
(d) Paneling: Suspended					
(c) SPI (d) Troweled					
(e) Other:					
Surface Area Asbestos (SF)					
Thickness Asbestos (in.)					
Calc. Volume Asbestos (CF)					
Cond. of Asbestos Mat'l (1)					
Coatings (2)					
Descript. of Activity (3)					
Work Population (4)					
Ventilation (5)					
Accessibility (6)					
Obstructions to Area (7)					
Physical Disturbances (8)					
Sensitive Equipment (9)					
Sug. Abate. Timing (10)					
Sug. Abate. Method (11)					
Sug. Airborne Monitor. (12)					
Specimen Number					
Sample Number					
Laboratory Results					
Photo Log (Roll/Frame)					
Comments: _____					

STEAM VESSELS

Vessel Designation	A	B	C	D	E
Location of Vessel (See Figure ____)					
Interior or Exterior (I/E)					
Approx. Dia. of Vessel (ft)					
Height of Vessel (f)					
Thickness of Asbestos (in.)					
Calc. Lagging Volume (CF)					
Cond. of Lagging Mat'l (1)					
Coatings/Coverings (2)					
Descript. of Activity (3)					
Work Population (4)					
Ventilation (5)					
Accessibility (6)					
Obstructions to Area (7)					
Physical Disturbances (8)					
Sensitive Equipment (9)					
Specimen Number					
Sample Number					
Laboratory Results					
Sug. Abate. Timing (10)					
Sug. Abate. Method (11)					
Sug. Airborne Monitor. (12)					
Photo Log (Roll/Frame)					
Comments: _____					

FLOORING MATERIALS	A	B	C	D	E
Location of Asbestos (See Figure _____)					
Type Flooring (e.g., tile)					
(a) Friable (b) Non-Friable					
Surface Area Asbestos (SF)					
Thickness Asbestos (in.)					
Calc. Volume Asbestos (CF)					
Cond. of Asbestos Mat'l (1)					
Coatings (2)					
Descript. of Activity (3)					
Work Population (4)					
Ventilation (5)					
Accessibility (6)					
Obstructions to Area (7)					
Physical Disturbances (8)					
Sensitive Equipment (9)					
Sug. Abate. Timing (10)					
Sug. Abate. Method (11)					
Sug. Airborne Monitor. (12)					
Specimen Number					
Sample Number					
Laboratory Results					
Photo Log (Roll/Frame)					
Comments: _____					

1. Condition of asbestos material:
  - (a) Undisturbed.
  - (b) Some water damage.
  - (c) Some physical damage (scuffs, tears, bruises).
  - (d) Some delamination evident.
  - (e) Extensive water damage.
  - (f) Extensive physical damage.
  - (g) Extensive delamination.
2. Coatings/Encapsulants/Coverings types:
  - (a) None.
  - (b) Coatings/encapsulants.
  - (c) Metal covering.
  - (d) Cloth covering.
  - (e) Structural enclosure.
  - (f) Other:\_\_\_\_\_.
3. Description of activities:
  - (a) Office/administration.
  - (b) Industrial warehouse.
  - (c) Industrial/process.
  - (d) Industrial/maintenance.
  - (e) Casual or incidental.
  - (f) Recreational.
  - (g) Unoccupied at present.
  - (h) Unscheduled maintenance.
  - (i) Other:\_\_\_\_\_.
4. Work population in area (estimate):
  - (a) None.
  - (b) 1-10.
  - (c) 11-50.
  - (d) 51-100.
  - (e) 101-500.
  - (f) >500.

5. Ventilation type:
  - (a) Natural.
  - (b) General forced air.
  - (c) Local forced air.
6. Accessibility to area:
  - (a) Within normal reach.
  - (b) 8-ft ladder.
  - (c) > 8-ft ladder.
  - (d) Plenum or crawl space congested.
  - (e) Isolated behind or under construction materials.
  - (g) Small tight spaces.
  - (h) Covered trench/vault.
  - (i) Other:\_\_\_\_\_.
7. Obstructions to asbestos area:
  - (a) None.
  - (b) Permanent equipment/furnishings/structures.
  - (c) Portable equipment/furnishings/structures.
8. Opportunities for physical disturbances:
  - (a) None.
  - (b) Normal vibrations from fans, closing doors, noise, etc.
  - (c) Physical abuse (scuffing, tearing, bruising).
  - (d) Other:\_\_\_\_\_.
9. Presence of sensitive equipment:  
Y=yes      N=no.
10. Suggested asbestos-abatement time frame(s):
  - (a) None required at this time.
  - (b) Upon planned remodeling or demolition.
  - (c) Immediate consideration.
11. Suggested type of asbestos abatement method:
  - (a) Removal.
  - (b) Isolation.
  - (c) Surface encapsulation.
  - (d) Penetrating encapsulation.
  - (e) Other:\_\_\_\_\_.



12. Suggested airborne asbestos-monitoring considerations:
- (a) None required under normal conditions.
  - (b) Initially to determine potential exposures.
  - (c) Initially and annually thereafter.

APPENDIX D

PROTOCOL FOR THE COLLECTION OF ASBESTOS SAMPLES

Follow the safety precautions and procedures dictated by MBGA.  
(See Item 2).

M.B. Gilbert & Associates requires, as a minimum, the following safety precautions in dealing with asbestos:

- (1) Measures and procedures to prevent asbestos exposure to any facility or visiting personnel will include, but not be limited to, the use of local exhaust ventilation with the HEPA Vacuum; selection of a sample site, removed from the general work areas, or conducting the sampling at non-work times; clean-up of the sample area with the HEPA Vacuum Cleaner and/or wet wipe; proper containerizing, labeling and disposal of asbestos and other contaminated items not intended for laboratory analysis, specimen cataloging or reuse. Questions or concerns should be discussed with the Field Coordinator.
- (2) Respiratory protection with a fitted half-mask respirator with particulate filter cartridge designed for asbestos materials, or use of air-supplied respirator systems where anticipated airborne asbestos concentrations could overload an air purifying respirator cartridge or where the protection factor would be inadequate for reducing exposures to the 2 fiber/cc air level.
- (3) Donning of all personal protective clothing and equipment will be performed as close to the sample site as is convenient and safe. Removal of such clothing and equipment will be performed in the same area, after thorough decontamination procedures are followed.
- (4) Record, and report, as soon as practicable to the Field Coordinator any event that occurred during the sample-taking procedure that could account for contamination of self and/or local/general work environments.

Samples will be placed in plastic sample vials and identified by: "Inspectors Initials, Date, Building Number-Reference Number", (i.e., MB1031G33-GA). Record the sample and descriptions on the appropriate Field Survey Form and the Laboratory Sample Number Log. Where possible, refer to the sample location on the diagrams.

A photograph of the sample location, after sampling, will be required, showing the sample location as it was left and including a "pointer" to help identify the sample location.

PRECEDING PAGE BLANK NOT FILMED

**APPENDIX E**

**GUIDANCE FOR THE SELECTION OF THE SUGGESTED TIMING  
FOR ASBESTOS-ABATEMENT PROCEDURES**

Table E-1. Guidance for the Selection of the Suggested Timing  
Asbestos-Abatement Procedures

Description of Material	Immediate	Near Future	Demolition/ Repair/Damage
1. Interior spray-on friable w/personnel exposed (none found)	X		
2. Exterior spray-on friable w/personnel exposed (none found)	X		
3. Exterior non-friable siding/roofing in good condition			X
4. Exterior non-friable siding/roofing, deteriorated (none found)		X	
5. Interior non-friable walls/ceilings/ floors in good condition			X
6. Interior non-friable walls/ceilings/ floors, deteriorated (none found)		X	
7. Plenum area w/sprayed-on asbestos- bearing material (none found)		X	
8. Plenum area w/sprayed-on asbestos- bearing material, badly damaged (none found)	X		
9. Pipes, and steam vessels, interior and exterior, with asbestos- containing insulation, <u>undamaged</u>		X	
10. Pipes and steam vessels, interior and exterior, with asbestos-containing insulation, which is severely damaged	X		
11. Pipes with <u>undamaged metal</u> insulation wrapping			X

PRECEDING PAGE BLANK NOT FILMED

APPENDIX F

CRITERIA FOR SELECTION OF AN ASBESTOS-ABATEMENT CONTRACTOR

Selecting a competent asbestos-abatement contractor is the first step toward successful asbestos abatement. The following recommendations should help:

- (1) Obtain the assistance of a technical advisor who will monitor the abatement work. This technical advisor can assist in writing job specifications and contractor selection.
- (2) Require evidence of contractor's experience and/or training in asbestos abatement.
- (3) The removal contractor must be a Certified Licensed Asbestos Contractor in the State of California.
- (4) Check references, including other asbestos-abatement projects cited.
- (5) Ask for detailed written descriptions of how asbestos abatement will be accomplished.
- (6) Ask contractor for copies of their Standard Operating Procedures.
- (7) Require proof of liability insurance.
- (8) Be specific about what levels of decontamination constitute a completed job. This will require both visual and air monitoring surveys.
- (9) Require proof of employee training in health hazards and personal protective equipment to be used.
- (10) Avoid contracting work in the summer. Many school asbestos-abatement projects are conducted during that season, limiting the number of competent contractors.

PRECEDING PAGE BLANK NOT FILMED

**APPENDIX G**  
**ASBESTOS-ABATEMENT CHECKLIST**



1. Description of work is complete and correct?
2. All Contractor employees have met the Medical Requirements of 8 CAC 5208?
3. Contractor employees have received instruction within the last three months in asbestos health hazards safety and health precautions, protective clothing and equipment, including respirators?
4. Contractor has secured the necessary permits in conjunction with asbestos removal, hauling, and disposal?
5. Contractor has notified proper local, state, or federal agencies of removal operations?
6. Copies of notifications, permits, standard operating procedures and respirator program are on file with the Facilities Asbestos Coordinator?
7. Monitoring of airborne asbestos levels area being conducted as per 8 CAC 5208 and under the direct supervision of an ABIH Certified Industrial Hygienist?

NAME \_\_\_\_\_

CERTIFICATION NUMBER \_\_\_\_\_

8. The contractor has submitted a detailed plan of the procedures to be used in the removal and demolition of materials containing asbestos? As a minimum, the plan includes the following:
  - (a) Location/type of each asbestos control area.
  - (b) Change rooms.
  - (c) Local exhaust systems/vacuums.
  - (d) Disposal plan.
  - (e) Wetting agents to be used.
  - (f) Air monitoring.
9. The laboratory analyzing airborne asbestos samples is an American Industrial Hygiene Association (AIHA)-accredited laboratory for asbestos. The lab is a successful participant in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) Program for asbestos?

LABORATORY NAME \_\_\_\_\_

LABORATORY ADDRESS \_\_\_\_\_

ACCREDITATION NUMBER \_\_\_\_\_

10. The contractor has submitted written evidence that the landfill for asbestos disposal is approved for asbestos disposal by USEPA and state or local regulatory agencies?

PRECEDING PAGE BLANK NOT FILMED

11. The contractor has submitted the name, address and Hazardous Waste Hauler Number of each vehicle used to haul waste to the asbestos-disposal site?
12. The contractor has provided signed training records for all employees involved in the removal, handling or disposal of asbestos wastes?
13. Only respirators approved by the National Institute for Occupational Safety and Health shall be used during the abatement?
14. Caution signs have been posted at all approaches to the asbestos-control area?
15. Contractor will use only wet methods to remove asbestos?
16. Only vacuums equipped with HEPA filters shall be used to vacuum asbestos wastes?
17. Employees may not eat, drink or smoke in asbestos-control areas?
18. All asbestos wastes are doubled-bagged and labeled as per 8 CAC 5208.
19. Clearance samples are conducted by NIOSH analytical method 7400, using aggressive sampling methods?
20. Clearance samples are below 0.01 fibers per cubic centimeter as an 8 hour TWA?

## APPENDIX H

### RESPIRATORY PROTECTION AGAINST MICROSCOPIC ASBESTOS FIBERS

- A. Asbestos occurs in air as microscopic fibers. These fibers remain suspended in air and can be inhaled and deposited in the respiratory system. It is important that the amount of deposited asbestos be minimized due to the adverse health effects associated with this material.
- B. The best respiratory protection is to minimize or eliminate airborne asbestos in the workplace. The second choice is to use some sort of respirator. Respirators are used when airborne concentrations are known or suspected to be greater than acceptable levels.
- C. There are two major types of respirators, air purifying and air supplying. Air purifying respirators remove a contaminant(s) from the ambient air and supplied air respirators have an independent (generally, bottled) supply of air. Both these types are used in asbestos-abatement work. Because asbestos is a particulate, it can be filtered from the air by dust-filter cartridges and HEPA cartridges.
- D. It is important that all respirators used for asbestos work be approved by NIOSH or MSHA. All approved equipment will show a clearly identified NIOSH or MSHA approval number, normally located on the cartridges (HEPA). Any hybridization or alteration of a respirator voids its NIOSH approval.
- E. There are several different styles of respirators. The major types are half-face, and full-face. Both of them can be used for asbestos work. A half-face respirator extends from the chin to the bridge of the nose and a full-face covers the entire face. Each respirator style has been tested for the effectiveness of fit and a number, called a "protection factor" has been assigned. Higher protection factors indicate better fit.

#### Respirator Protection Factors

Type	Protection Factor
<u>Air-purifying</u>	
Half-face	10x
Full-face	50x
<u>Supplied air</u>	
Pressure demand full-face (airline respirator)	2,000x
Self-contained breathing apparatus	10,000x

- F. To assure that a specific respirator type and size offer acceptable protection the respirator must be fit-tested on the individual who will wear it. There are two techniques for fit-testing, quantitative and qualitative. Quantitative fit-testing is very precise and requires extensive equipment. Qualitative fit-testing is less precise, less expensive, and the choice of most employers. In qualitative fit-testing, the employee dons the respirator and is exposed to an odorous or irritating atmosphere. If he/she does not detect the contaminant while talking and exercising a successful fit has been achieved.
- G. Respirator cartridges are identified by written information and color coding.
- (1) Organic vapors - Black.
  - (2) Acid gas - White.
  - (3) Organic vapors and acid gas - Yellow.
  - (4) Ammonia and methylamine - Green.
  - (5) HEPA (dust, fumes, mists) - Magenta.
- H. The most effective cartridge type for use around asbestos is the HEPA filter. This filter removes dust and other particles from the air with an efficiency of greater than 99 percent. Cartridges should be replaced before each shift.
- I. When should you wear a respirator?
- (1) During initial cleanup.
  - (2) During cleanup of contaminated areas.
  - (3) In any area designated by the Facilities Asbestos Coordinator.
- J. Procedure for respirator donning:
- (1) Inspect respirator.
    - (a) Cracked seal.
    - (b) Functional inlet/outlet valves.
    - (c) Intact straps.

- (2) Replace cartridges.
  - (a) Use only new cartridges.
  - (b) Cartridges must match respirator.
- (3) Don respirator.
- (4) Perform negative and positive pressure check.
- (5) Enter work area.

K. Procedure for Respirator Removal.

- (1) Remove other protective clothing.
- (2) Remove respirator.
- (3) Remove cartridges and discard as ACM.
- (4) Wash respirator in utility sink with soap and disinfectant.
- (5) Air dry.

L. It is important to remember that air purifying respirators have certain limitations.

M. Restrictions Associated with Air Purifying Respirators.

- (1) Because it does not supply oxygen, it cannot be used in oxygen-deficient atmospheres.
- (2) Good facepiece seal is critical.
- (3) Limited to use in lightly contaminated areas.
- (4) Cartridges (filtering elements) have limited-use life and are easily clogged.
- (5) Contaminants must display good warning properties.
- (6) Full-face respirator presents a fogging problem.
- (7) Half-face respirators provide limited skin protection.
- (8) Contact lenses cannot be worn with respirators.
- (9) Eyeglasses cannot be worn with full-face respirators.
- (10) There can be no obstruction between the wearer's skin and the facepiece.

George C. Marshall Space Flight Center  
Marshall Space Flight Center, Alabama  
35812

ORIGINAL PAGE IS  
OF POOR QUALITY

Reply to Attn of

ASD1M

April 5, 1985

To: ASD1; Robert W. Phillips

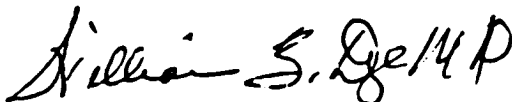
From: ASD1M; Medical Center

Subject: Respiratory Protection for Asbestos Workers  
Update to letter dated Jan. 3, 1985

After thorough discussions with Mr. Gene Proctor, NASA Headquarters Environmental Health and a thorough review of literature and OSHA regulations(1910.1001), we recommend the following guidelines be used at MSFC for asbestos workers.

1. Disposable respirators will not be used for any type of asbestos work.
2. All persons who must work in close proximity to asbestos (e.g., Kentron communications workers, electricians, plumbers, carpenters) will be fitted with a half-face twin cartridge, full-face twin cartridge, air powered respirator with high efficiency filter or other respirator approved by ASD1M.
3. All persons who perform work with asbestos in the demolition or removal will be required to wear a type "C" continuous flow respirator.

If you have any questions about the above guidelines, please contact John W. Noblin, 3-2390.



William B. Dye, M.D.  
Medical Director

## APPENDIX J

### LEVEL I AND II ASBESTOS TRAINING PROGRAMS

Description of Level I and Level II Training Programs, along with Training Records and Certificates of Completion for Personnel who Participated in the Training Programs.



## INTRODUCTION

On September 8 and 9, 1986, Level I and II asbestos training programs were given to maintenance/facilities employees at the JPL-Bendix facility in Barstow, California.

Level I training is a program to acquaint personnel with asbestos-containing materials (ACM) and governmental regulations. Level II training is given to employees whose job activities may possibly lead them to come in contact with ACM and the potential to be exposed to airborne asbestos fibers.

## SCOPE OF TRAINING

The Level I and II training programs were presented by a team of industrial hygienists and required attendance for 8 hours.

The training included discussion of the following topics:

- (1) Description of asbestos-containing materials.
- (2) Health hazards associated with asbestos exposure.
- (3) Explanation of current legislation/regulations concerning ACM.
- (4) The purpose for and description of the monitoring program.
- (5) The purpose for and description of the medical surveillance program, including pulmonary function testing for all employees who are issued respirators.
- (6) Specific work guidelines, including dust control measures, and cleanup and disposal methods.
- (7) Decontamination procedures.
- (8) Respiratory protection, including a discussion and demonstration of the use and care of respirators as well as qualitative respirator fit testing.
- (9) Personal protective clothing, including a discussion and demonstration of its use and disposal.
- (10) The specific nature of the operations and specific information to aid the employee in recognizing when and where asbestos exposure may result.

Employees who attended the Level I and II Asbestos training programs on September 8 and September 9 are listed separately. Included along with the respirator fit forms of those employees attending the training are their Certificates of Completion of the training.

Accurate records of training dates should be maintained by JPL.

# M.B. GILBERT ASSOCIATES

ENVIRONMENTAL ENGINEERING, DESIGN, AND CONSULTING SERVICES

December 17, 1986

Mr. Glen Kroll  
JPL  
4800 Oakgrove Dr.  
Pasadena, CA 91109

Dear Mr. Kroll:

Enclosed is the report on the Asbestos Level I and II training performed at the JPL-Bendix facility in Barstow, California. The training was performed on September 8 and 9, 1986.

If you have any questions, please feel free to contact me.

Sincerely,

*Marcia Baverman*

Marcia Baverman  
Industrial Hygienist

MB/tf:R275/R10  
#1831

PRECEDING PAGE BLANK NOT FILMED

Table J-1. Attendees of Asbestos Level I and II Training

September 8, 1986 Name	September 9, 1986 Name
E.R. Greene	Ed Hignett
Jim May	Roland Moss
J. Hay	Carl Gentry
Steve H. Jones	Ken Amari
William Noffsinger	Scott Craig
Elaine Walters	Tony Jaramklo
Antonio Ortiz	Wayne Delaney
Russel E. Cronauer	William C. Delaney
Vincent Rodriguez	Richard D. Martinez
Thomas Kelley	Edward L. Weaver
L.A. Rodriguez	Gordon E. McCain
Roger Berdugo	Willie Bussey
Bruce Wilcott	Jack Horner
Todd Chambers	Vernon Heichelbech
Verlyn Johnson	Stephen G. King
Peter S. Duran	Jay Potter
Thomas R. Allen	Nick Krommenhoek
Billy A. Bollinger	
Art Schroeder	
Marsha Gilbert	
G. Kroll	
William Benson	

PRECEDING PAGE BLANK NOT FILMED

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
(PLEASE PRINT) Allen, Thomas

SOCIAL SECURITY  
NUMBER: 484-46-3855

EMPLOYER NAME: JPL

JOB DESCRIPTION: Diesel Mech

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

- A. WILSON SMALL ☐ MEDIUM ☐
- B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐
- C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)
- D. 3M #9910 ☐ #9920 ☐
- E. NONE ☐ BECAUSE OF FACIAL HAIR ☐
- F. OTHER (TYPE) North 1/2 face Rysm

DATE OF RESPIRATOR INSTRUCTION 8/9/05/86

EMPLOYEE SIGNATURE: Thomas Allen

DATE: 8/9/86

CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Thomas Allen

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT BARTSTOW, CA

Marcia Boverman / Woody Hill  
PRESIDENT

Beard

RESPIRATOR - TRAINING

EMPLOYEE NAME: (PLEASE PRINT) Kenneth J. Amar SOCIAL SECURITY NUMBER: 560-62-1048

EMPLOYER NAME: \_\_\_\_\_

JOB DESCRIPTION: Maint. Supv. ASSE ANT

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON SMALL ☐ MEDIUM ☐

B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐

C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)

D. 3M #9910 ☐ #9920 ☐

E. NONE ☐ BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) \_\_\_\_\_

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: X Kenneth Amar DATE: 09/09/86

CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Ken O'mara

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bastlaw, CA

Marcia Baveeman / Woody Hill  
PRESIDENT

# RESPIRATOR - TRAINING

EMPLOYEE NAME: PLEASE PRINT) Berdugo, Reger SOCIAL SECURITY NUMBER: 553-29-7905

EMPLOYER NAME: \_\_\_\_\_

JOB DESCRIPTION: Electrician

## FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM <input type="checkbox"/> (Black)	LARGE <input type="checkbox"/> (Green)
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>	BECAUSE OF FACIAL HAIR <input type="checkbox"/> <u>Yes find it</u>		
F. OTHER (TYPE) <input checked="" type="checkbox"/>	<u>North 1/2 face Lg.</u>		

DATE OF RESPIRATOR INSTRUCTION 09/05/01

EMPLOYEE SIGNATURE: Roger L. Berdugo DATE: 9/5/01



ORIGINAL PAGE IS  
OF POOR QUALITY

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Roger Berdugo

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Barstow, CA

Marcia Boverman / Woody Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
(PLEASE PRINT)

*Billingst Billy L.*

SOCIAL SECURITY  
NUMBER:

*762-29-3158*

EMPLOYER NAME:

JOB DESCRIPTION:

*Plumber / Pipe Fitter*

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON

SMALL ☐

MEDIUM ☐

B. MSA

SMALL ☐

MEDIUM ☐

LARGE ☐

C. NORTON

MEDIUM ☐  
(Black)

LARGE ☐  
(Green)

D. 3M

#9910 ☐

#9920 ☐

E. NONE ☐

BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) *North 1/2 face Lg.*

DATE OF RESPIRATOR INSTRUCTION

*9/6/66*

EMPLOYEE SIGNATURE:

*X Billy A. Bell*

DATE: *9/8/66*

ORIGINAL PAGE IS  
OF POOR QUALITY

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Billy Bollinger

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Bardonia, CA

Marcia Boverman/Worley Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
PLEASE PRINT) Willie Bussey

SOCIAL SECURITY  
NUMBER: 249-40-1339

EMPLOYER NAME:

JOB DESCRIPTION: Maint. Helper

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON

SMALL ☐

MEDIUM ☐

B. MSA

SMALL ☐

MEDIUM ☐

LARGE ☐

C. NORTON

MEDIUM ☐  
(Black)

LARGE ☐  
(Green)

D. 3M

#9910 ☐

#9920 ☐

E. NONE ☐

BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) North and Lg.

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: X Willie Bussey

DATE: 09/09/86

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Willie Bussey

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bartow, CA

Marcia Baveaux-Woodley  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
PLEASE PRINT) Todd Chambers

SOCIAL SECURITY  
NUMBER: 146 36 -47411

EMPLOYER NAME: JPL

JOB DESCRIPTION: HVAC Tech.

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

- A. WILSON SMALL ☐ MEDIUM ☐
- B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐
- C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)
- D. 3M #9910 ☐ #9920 ☐
- E. NONE ☐ BECAUSE OF FACIAL HAIR ☐
- F. OTHER (TYPE) North Lg. 1/2 face

DATE OF RESPIRATOR INSTRUCTION 09/08/81

EMPLOYEE SIGNATURE: X Todd Chambers

DATE: 09/08/81

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Todd Chambers

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Boston, CA

Marcie Baveeman/Woodly Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME: Jeffrey Craig SOCIAL SECURITY  
PLEASE PRINT) NUMBER: 560-98-1593

EMPLOYER NAME:

JOB DESCRIPTION: Mixed Carpenter

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON SMALL ☐ MEDIUM ☐

B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐

C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)

D. 3M #9910 ☐ #9920 ☐

E. NONE ☐ BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) \_\_\_\_\_

DATE OF RESPIRATOR INSTRUCTION 09-69-86

EMPLOYEE SIGNATURE: L. J. Scott Craig

DATE: 09/0



CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Scott Craig

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Banister, CA

Marcia Baccamano / Woody Z. Hill  
PRESIDENT

not pass PFT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME: (PLEASE PRINT) Russel E. CRONALER SOCIAL SECURITY NUMBER: 220-05-2527

EMPLOYER NAME: Kentron

JOB DESCRIPTION: Electrician

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?		
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?		
B. CARE AND CLEANING OF RESPIRATORS?		
C. USES AND LIMITATIONS OF RESPIRATORS?		
D. HEALTH HAZARDS OF YOUR JOB?		
E. USE OF AIR-FED RESPIRATOR?		
F. USE OF SINGLE-USE DUST RESPIRATOR?		

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

- A. WILSON SMALL ☐ MEDIUM ☐
- B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐
- C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)
- D. 3M #9910 ☐ #9920 ☐
- E. NONE ☐ BECAUSE OF FACIAL HAIR ☐
- F. OTHER (TYPE) \_\_\_\_\_

DATE OF RESPIRATOR INSTRUCTION \_\_\_\_\_

EMPLOYEE SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Russel Cronauer

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Banston, CA

Marcia Baveeman-Woodly Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

## RESPIRATOR - TRAINING

EMPLOYEE NAME: (PLEASE PRINT) Wayne Delaney

SOCIAL SECURITY  
NUMBER: 562-76-1112

EMPLOYER NAME: SPL.

**JOB DESCRIPTION:**

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

ESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM (Black) <input type="checkbox"/>	LARGE (Green) <input type="checkbox"/>
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>	BECAUSE OF FACIAL HAIR <input type="checkbox"/>		
F. OTHER (TYPE)			

TE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: Wayne Helander

DATE: 09/06

# CERTIFICATE OF COMPLETION

## **MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Wayne Delaney

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bartow, CA

Marcia Cavellman / Woody Hill  
PRESIDENT

## RESPIRATOR - TRAINING

SOCIAL SECURITY  
NUMBER: 558-9084

JOB DESCRIPTION: *Electrician*

FILL OUT BALANCE OF FORM AT END OF TRAINING

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM (Black) <input type="checkbox"/>	LARGE (Green) <input type="checkbox"/>
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>	BECAUSE OF FACIAL HAIR <input type="checkbox"/>		
F. OTHER (TYPE)	<u>North-Med. 1/2 face</u>		

DATE: 09/09/

# CERTIFICATE OF COMPLETION

## **MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

William Delaney

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bardonia, CA

Marcia Bavezman/Woolly Hill  
PRESIDENT

RESPIRATOR - TRAINING

ORIGINAL PAGE IS  
OF POOR QUALITY

EMPLOYEE NAME: (PLEASE PRINT) <u>Duncan, Peter</u>	SOCIAL SECURITY NUMBER: <u>565-30-9931</u>
---	---

EMPLOYER NAME: \_\_\_\_\_

JOB DESCRIPTION: HVAC Tech

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM <input type="checkbox"/> (Black)	LARGE <input type="checkbox"/> (Green)
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>	BECAUSE OF FACIAL HAIR <input type="checkbox"/>		
F. OTHER (TYPE) <u>North 1/2 face - Lg.</u>			

DATE OF RESPIRATOR INSTRUCTION 09/08/86

EMPLOYEE SIGNATURE: <u>Peter S. Duncan</u>	DATE: <u>9-8-86</u>
--	---------------------



CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Peter Duran

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Boston, CA

Marcia Baveunas/Worby Hill  
PRESIDENT

RESPIRATOR - TRAINING

ORIGINAL PAGE IS  
OF POOR QUALITY

EMPLOYEE NAME:

PLEASE PRINT) Carl Gentry

SOCIAL SECURITY

NUMBER: 485-28-6656

EMPLOYER NAME:

JOB DESCRIPTION:

Electrician

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check be	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

- A. WILSON SMALL ☐ MEDIUM ☐
- B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐
- C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)
- D. 3M #9910 ☐ #9920 ☐
- E. NONE ☐ BECAUSE OF FACIAL HAIR ☐
- F. OTHER (TYPE) North Med.

DATE OF RESPIRATOR INSTRUCTION 09-04-86

EMPLOYEE SIGNATURE:

Carl G. Gentry

DATE: 09/07/86

CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Carl Gentry

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Baustow, CA

Marcia Boreman / Woody J. Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:

PLEASE PRINT) Greene, Charles

SOCIAL SECURITY

NUMBER: 5 73 35 - 1619

EMPLOYER NAME: J.I.

JOB DESCRIPTION: Facilities Support Supervisor

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS

ANSWERS (please check below)

YES

NO

ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?

✓

HAVE YOU RECEIVED INSTRUCTION ON:

A. PROPER WEARING OF RESPIRATORS?

✓

B. CARE AND CLEANING OF RESPIRATORS?

✓

C. USES AND LIMITATIONS OF RESPIRATORS?

✓

D. HEALTH HAZARDS OF YOUR JOB?

✓

E. USE OF AIR-FED RESPIRATOR?

✓

F. USE OF SINGLE-USE DUST RESPIRATOR?

✓

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON

SMALL ☐

MEDIUM ☐

B. MSA

SMALL ☐

MEDIUM ☐

LARGE ☐

C. NORTON

MEDIUM ☐  
(Black)

LARGE ☐  
(Green)

D. 3M

#9910 ☐

#9920 ☐

E. NONE ☐

BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) ✓ North 1/2 face Lg.

DATE OF RESPIRATOR INSTRUCTION

09/05/86

EMPLOYEE SIGNATURE:

C. Greene

DATE: 09/86

CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Charles Greene

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Bairstow, CA

Marcia Baverman / Woody Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:

(PLEASE PRINT)

Hay, John

SOCIAL SECURITY

NUMBER: 457-641-7525

EMPLOYER NAME:

T/L

JOB DESCRIPTION: Maint. Electrician.

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON

SMALL ☐

MEDIUM ☐

B. MSA

SMALL ☐

MEDIUM ☐

LARGE ☐

C. NORTON

MEDIUM ☐  
(Black)

LARGE ☐  
(Green)

D. 3M

#9910 ☐

#9920 ☐

E. NONE ☐

BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) North 1/2 Face Lg.

DATE OF RESPIRATOR INSTRUCTION 09/05/80

EMPLOYEE SIGNATURE:

John Hay

DATE: 09/05/80

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

John Hay

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Bartow, CA

Marcia Bawerman/Woodly Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
PLEASE PRINT) Vernon Heichelbech

SOCIAL SECURITY  
NUMBER: 390-20-4695

EMPLOYER NAME:

JOB DESCRIPTION: Electrician

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM <input type="checkbox"/> (Black)	LARGE <input type="checkbox"/> (Green)
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>	BECAUSE OF FACIAL HAIR <input type="checkbox"/>		
F. OTHER (TYPE)	<u>North 1/2 Face Mod.</u>		

DATE OF RESPIRATOR INSTRUCTION 04/09/86

EMPLOYEE SIGNATURE: X Vernon R. Heichelbech DATE: 04/09/86



# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.  
OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Vernon Heichelbich

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bartstow, CA

Marcia Bawerman / Woody Hill  
PRESIDENT

Beard

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
(PLEASE PRINT) Ed. S. Hignett

SOCIAL SECURITY  
NUMBER: 535-36-7115

EMPLOYER NAME:

JOB DESCRIPTION: Sr. Eng. Aide

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM <input type="checkbox"/> (Black)	LARGE <input type="checkbox"/> (Green)
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>			BECAUSE OF FACIAL HAIR <input type="checkbox"/>
F. OTHER (TYPE) _____			

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: Ed. S. Hignett

DATE: 09/09

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Ed Higneth

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Barstow, CA

Marcia Baveemas/Worley Hill  
PRESIDENT

# RESPIRATOR - TRAINING

EMPLOYEE NAME: (PLEASE PRINT) Jack Horner SOCIAL SECURITY NUMBER: 578-86-7805

EMPLOYER NAME: \_\_\_\_\_

JOB DESCRIPTION: Sr. Eng. Aide

## FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:	<input type="checkbox"/>	<input type="checkbox"/>
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

- A. WILSON SMALL ☐ MEDIUM ☐
- B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐
- C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)
- D. 3M #9910 ☐ #9920 ☐
- E. NONE ☐ BECAUSE OF FACIAL HAIR ☐
- F. OTHER (TYPE) North 1/2 face

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: Jack Horner DATE: 09/09/86

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Jack Horner

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Barstow, CA

Marcia Baveemas / Woody Aul  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
PLEASE PRINT) Antonio Jaramillo SOCIAL SECURITY  
NUMBER: 565-94-4007

EMPLOYER NAME: JPL

JOB DESCRIPTION: HVAC tech

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON SMALL ☐ MEDIUM ☐

B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐

C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)

D. 3M #9910 ☐ #9920 ☐

E. NONE ☐ BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) \_\_\_\_\_

DATE OF RESPIRATOR INSTRUCTION 09/09/09

EMPLOYEE SIGNATURE: Antonio Jaramillo DATE: 09/09

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Tony Jaramillo

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bastow, CA

Marcia Bawleman / Woody Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

NUMBER: 422-36-0677

JOB DESCRIPTION: Chief Mech.

## QUESTIONS

**YES**

NO

F. USE OF SINGLE-USE DUST RESPIRATOR?

F. OTHER (TYPE) *North Y<sub>2</sub> Line.*

DATE: 07/16/20



# CERTIFICATE OF COMPLETION

## **MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Verlynn Johnson

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Boston, CA

Marcia Bavee-mee / Woody Hill  
PRESIDENT

RESPIRATOR - TRAINING

ORIGINAL PAGE IS  
OF POOR QUALITY

EMPLOYEE NAME:  
(PLEASE PRINT) Steve Jones

SOCIAL SECURITY  
NUMBER: 64-48-2915-

EMPLOYER NAME:

JOB DESCRIPTION: Facilities Tech

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check be	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

- A. WILSON SMALL ☐ MEDIUM ☐
- B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐
- C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)
- D. 3M #9910 ☐ #9920 ☐
- E. NONE ☐ BECAUSE OF FACIAL HAIR ☐
- F. OTHER (TYPE) North 1/2 fac. cap.

DATE OF RESPIRATOR INSTRUCTION 09/05/56

EMPLOYEE SIGNATURE: Steve A. Jones

DATE: 9-8-56

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Steve Jonas

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Bartons, CA

Marcia Baveeman/Woodhill  
PRESIDENT

# RESPIRATOR - TRAINING

EMPLOYEE NAME: PLEASE PRINT) <i>Kelley, Thomas</i>	SOCIAL SECURITY NUMBER: <i>151-26-3431</i>
EMPLOYER NAME: <i>JPL</i>	
JOB DESCRIPTION: <i>HVAC Tech</i>	

## FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM (Black) <input type="checkbox"/>	LARGE (Green) <input type="checkbox"/>
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>	BECAUSE OF FACIAL HAIR <input type="checkbox"/>		
F. OTHER (TYPE)	<i>North 1/2 Large</i>		

### DATE OF RESPIRATOR INSTRUCTION

EMPLOYEE SIGNATURE: <i>X Thomas Kelley</i>	DATE: <i>8/3/03</i>
--	---------------------

ORIGINAL PAGE IS  
OF POOR QUALITY

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Thomas Kelley

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Bartlow, CA

Marcia Baveerman/Woody Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
(PLEASE PRINT) King, Stephen

SOCIAL SECURITY  
NUMBER: 520-44-159

EMPLOYER NAME: JPL

JOB DESCRIPTION: Facil. Supr.

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check be	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM <input type="checkbox"/> (Black)	LARGE <input type="checkbox"/> (Green)
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>	BECAUSE OF FACIAL HAIR <input type="checkbox"/>		
F. OTHER (TYPE)	<u>North 1/2 face Med.</u>		

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: Stephen L. King

DATE: 09/09/86

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Stephens King

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Baustow, CA

Marcia Baseman / Woody Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY.

## RESPIRATOR - TRAINING

EMPLOYEE NAME:  
PLEASE PRINT) Glen Kroell

SOCIAL SECURITY  
NUMBER: 319-32-4577

EMPLOYER NAME: JPL

JOB DESCRIPTION:

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

ESPIRATOR(S) THAT FIT WITHOUT LEAK:

SMALL ☐MEDIUM ☐SMALL ☐MEDIUM ☐

LARGE ☐

MEDIUM ☐  
(Black)

LARGE ☐  
(Green)

#9910 ☐#9920 ☐

BECAUSE OF FACIAL HAIR

F. OTHER (TYPE) North Med 1/2 face - e HEPA

TE OF RESPIRATOR INSTRUCTION 09-09-86

EMPLOYEE SIGNATURE:

DATE: 06/00



# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Glen Kroll

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Barstow, CA

Marcia Baveaux / Woody Ail  
PRESIDENT

Beard

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
PLEASE PRINT) Nick Krammer Hoek

SOCIAL SECURITY  
NUMBER: 254-98-4105

EMPLOYER NAME: JPL

JOB DESCRIPTION: Hvy. Equip. Oper

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check below)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

- A. WILSON SMALL ☐ MEDIUM ☐
- B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐
- C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)
- D. 3M #9910 ☐ #9920 ☐
- E. NONE ☐ BECAUSE OF FACIAL HAIR ☐
- F. OTHER (TYPE) \_\_\_\_\_

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: Nick Krammer Hoek DATE: 9/9/86

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Dick Krammshoeck

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bastow, CA

Marcia Baccmann/Barry Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
(PLEASE PRINT) Richard Martinez SOCIAL SECURITY  
NUMBER: 585-86-7223

EMPLOYER NAME: \_\_\_\_\_

JOB DESCRIPTION: Electrician

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON SMALL ☐ MEDIUM ☐

B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐

C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)

D. 3M #9910 ☐ #9920 ☐

E. NONE ☐ BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) North 1/2 face N.I.D.

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: X Richard I Martinez DATE: 09/86

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Richard D. Martinez

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bartstow, CA

Marcia Baveerman-Woodby Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME: James SOCIAL SECURITY NUMBER: 233-62-0427  
PLEASE PRINT)  
EMPLOYER NAME: JPL  
JOB DESCRIPTION: Superintendent

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON SMALL ☐ MEDIUM ☐  
B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐  
C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)  
D. 3M #9910 ☐ #9920 ☐  
E. NONE ☐ BECAUSE OF FACIAL HAIR ☐  
F. OTHER (TYPE) North 100

DATE OF RESPIRATOR INSTRUCTION 09/05/86

EMPLOYEE SIGNATURE: James L. May DATE: 09/05/86

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

James May

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Barstow, CA

Marcia Baccaman / Woody Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME: (PLEASE PRINT) Gordon Mc Cain SOCIAL SECURITY NUMBER: 561-28-3561  
EMPLOYER NAME: 561-28-3561  
JOB DESCRIPTION: Diesel Mech.

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON SMALL ☐ MEDIUM ☐  
B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐  
C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)  
D. 3M #9910 ☐ #9920 ☐  
E. NONE ☐ BECAUSE OF FACIAL HAIR ☐  
F. OTHER (TYPE) North Med. 1/2 Face

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: X Gordon E. Mc Cain DATE: 09/09/86



# CERTIFICATE OF COMPLETION

## **MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Gordon McCain

HAS COMPLETED  8  HOURS OF:

General Asbestos Training

ON  September 9, 1986  AT  Bantow, CA

Marcia Barenman / Judy Hill   
PRESIDENT

*PFT Failure*

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
PLEASE PRINT)

*Roland Moss*

SOCIAL SECURITY  
NUMBER:

*354-20-2209*

EMPLOYER NAME:

JOB DESCRIPTION:

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON

SMALL ☐

MEDIUM ☐

B. MSA

SMALL ☐

MEDIUM ☐

LARGE ☐

C. NORTON

MEDIUM ☐  
(Black)

LARGE ☐  
(Green)

D. 3M

#9910 ☐

#9920 ☐

E. NONE ☐

BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) \_\_\_\_\_

DATE OF RESPIRATOR INSTRUCTION *09/09/86*

EMPLOYEE SIGNATURE:

*Roland L Moss*

DATE: *09/09/86*

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Roland Moss

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Bastow, CA

Marcia Baveemas/Woody J. Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:

PLEASE PRINT) N. H. Singer, William

SOCIAL SECURITY

NUMBER: 55-0-86-5154

EMPLOYER NAME:

JOB DESCRIPTION: Chief Mech.

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

- A. WILSON SMALL ☐ MEDIUM ☐
- B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐
- C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)
- D. 3M #9910 ☐ #9920 ☐
- E. NONE ☐ BECAUSE OF FACIAL HAIR ☐
- F. OTHER (TYPE) North Lg. 1/2 face

DATE OF RESPIRATOR INSTRUCTION 09/05/56

EMPLOYEE SIGNATURE: William G. Singer

DATE: 9/5/56

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

William Nofflinger

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Bartow, CA

Marcia Baveerman / Wendy Hill  
PRESIDENT

RESPIRATOR - TRAINING

EMPLOYEE NAME:

PLEASE PRINT) Antonio A Ortiz

SOCIAL SECURITY

NUMBER: 525-70-1086

EMPLOYER NAME:

JOB DESCRIPTION: Mech

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON

SMALL ☐

MEDIUM ☐

B. MSA

SMALL ☐

MEDIUM ☐

LARGE ☐

C. NORTON

MEDIUM ☐  
(Black)

LARGE ☐  
(Green)

D. 3M

#9910 ☐

#9920 ☐

E. NONE ☐

BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) ☒ North Med. 1/2 face

DATE OF RESPIRATOR INSTRUCTION 09/08/86

EMPLOYEE SIGNATURE: X Antonio A Ortiz

DATE: 09/86

CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Antonio Ortiz

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Barstow, CA

Marcia Baveenan/Woody Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME: Jay Potter SOCIAL SECURITY  
PLEASE PRINT) NUMBER: 550-17-0472  
EMPLOYER NAME: 550-17-0472  
JOB DESCRIPTION: Welder

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON SMALL ☐ MEDIUM ☐  
B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐  
C. NORTON MEDIUM ☐ LARGE ☐  
(Black) (Green)  
D. 3M #9910 ☐ #9920 ☐  
E. NONE ☐ BECAUSE OF FACIAL HAIR ☐  
F. OTHER (TYPE) North Med.

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: Jay Potter DATE: 09/09



# CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Jay Potter

HAS COMPLETED 8 HOURS OF:

general Asbestos Training

ON September 9, 1986 AT Barklow, CA

Marcie Baverman/Woody Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
(PLEASE PRINT) Rodriguez, Luis A.

SOCIAL SECURITY  
NUMBER: 551-38-4008

EMPLOYER NAME:

JOB DESCRIPTION: Gen. Maint

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?		
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?		
B. CARE AND CLEANING OF RESPIRATORS?		
C. USES AND LIMITATIONS OF RESPIRATORS?		
D. HEALTH HAZARDS OF YOUR JOB?		
E. USE OF AIR-FED RESPIRATOR?		
F. USE OF SINGLE-USE DUST RESPIRATOR?		

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM <input type="checkbox"/> (Black)	LARGE <input type="checkbox"/> (Green)
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>		BECAUSE OF FACIAL HAIR <input type="checkbox"/>	
F. OTHER (TYPE) <u>North 1-1/2 face</u>			

DATE OF RESPIRATOR INSTRUCTION 09/08/56

EMPLOYEE SIGNATURE: Luis A. Rodriguez

DATE: 9/8/56

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Luis Rodriguez

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Castroville, CA

Marcia Baveerman/Worley Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:  
PLEASE PRINT)

Vincent Rodriguez

SOCIAL SECURITY  
NUMBER:

568-98-3398

EMPLOYER NAME:

SPL

JOB DESCRIPTION:

Painter

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	X	
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	X	
B. CARE AND CLEANING OF RESPIRATORS?	X	
C. USES AND LIMITATIONS OF RESPIRATORS?	X	
D. HEALTH HAZARDS OF YOUR JOB?	X	
E. USE OF AIR-FED RESPIRATOR?	X	
F. USE OF SINGLE-USE DUST RESPIRATOR?	X	

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON / NORTH		MEDIUM (Black) <input checked="" type="checkbox"/>	LARGE (Green) <input type="checkbox"/>
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>		BECAUSE OF FACIAL HAIR <input type="checkbox"/>	
F. OTHER (TYPE)			

DATE OF RESPIRATOR INSTRUCTION

9-8-86

EMPLOYEE SIGNATURE:

Vincent E Rodriguez

DATE: 9-8-

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Vincent Rodriguez

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Carson, CA

Marcia Baveeman/Woodlyhill  
PRESIDENT

# RESPIRATOR - TRAINING

EMPLOYEE NAME: Arleigh Schreder SOCIAL SECURITY NUMBER: 475-28-9022  
 PLEASE PRINT)  
 EMPLOYER NAME: JPL  
 JOB DESCRIPTION: Supv. - Safety

## FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON SMALL ☐ MEDIUM ☐  
 B. MSA SMALL ☐ MEDIUM ☐ LARGE ☐  
 C. NORTON MEDIUM ☐ LARGE ☐  
 (Black) (Green)  
 D. 3M #9910 ☐ #9920 ☐  
 E. NONE ☐ BECAUSE OF FACIAL HAIR ☐  
 F. OTHER (TYPE) North 1/2 face Med. E Heps

DATE OF RESPIRATOR INSTRUCTION 09/09/86

EMPLOYEE SIGNATURE: X Arleigh H Schreder DATE: 09/09

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Art Schroeder

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Barstow, CA

Marcia Cavemans/Worby Hill  
PRESIDENT

ORIGINAL PAGE IS  
OF POOR QUALITY

RESPIRATOR - TRAINING

EMPLOYEE NAME:

PLEASE PRINT) W. H. H. S. F. Taine

SOCIAL SECURITY  
NUMBER:

4 39-58-361

EMPLOYER NAME:

JOB DESCRIPTION:

FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check be	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON

SMALL ☐

MEDIUM ☐

B. MSA

SMALL ☐

MEDIUM ☐

LARGE ☐

C. NORTON

MEDIUM ☐  
(Black)

LARGE ☐  
(Green)

D. 3M

#9910 ☐

#9920 ☐

E. NONE ☐

North by 1/2 face

BECAUSE OF FACIAL HAIR ☐

F. OTHER (TYPE) \_\_\_\_\_

DATE OF RESPIRATOR INSTRUCTION 09/8/86

EMPLOYEE SIGNATURE:

W. H. H. S. F. Taine

DATE: 9/5/86



# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Elaine Walters

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Bairstow, CA

Marcia Baveeman/Woodly Hill  
PRESIDENT

## RESPIRATOR - TRAINING

NUMBER: 562-45-0377

JOB DESCRIPTION: Maint. Electrician

J-78

# CERTIFICATE OF COMPLETION

## MED-TOX

ASSOCIATES, INC.

OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Edward Weaver

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 9, 1986 AT Baustow, CA

Marcia Baveemas /ubody Hill  
PRESIDENT

# RESPIRATOR - TRAINING

EMPLOYEE NAME: (PLEASE PRINT) Bruce W. Wickett SOCIAL SECURITY NUMBER: 196-40-5591

EMPLOYER NAME: \_\_\_\_\_

JOB DESCRIPTION: Crane Operator

## FILL OUT BALANCE OF FORM AT END OF TRAINING

QUESTIONS	ANSWERS (please check box)	
	YES	NO
ARE YOU PHYSICALLY FIT TO WEAR RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
HAVE YOU RECEIVED INSTRUCTION ON:		
A. PROPER WEARING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. CARE AND CLEANING OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. USES AND LIMITATIONS OF RESPIRATORS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D. HEALTH HAZARDS OF YOUR JOB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. USE OF AIR-FED RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. USE OF SINGLE-USE DUST RESPIRATOR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

RESPIRATOR(S) THAT FIT WITHOUT LEAK:

A. WILSON	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	
B. MSA	SMALL <input type="checkbox"/>	MEDIUM <input type="checkbox"/>	LARGE <input type="checkbox"/>
C. NORTON		MEDIUM <input type="checkbox"/> (Black)	LARGE <input type="checkbox"/> (Green)
D. 3M	#9910 <input type="checkbox"/>	#9920 <input type="checkbox"/>	
E. NONE <input type="checkbox"/>	BECAUSE OF FACIAL HAIR <input type="checkbox"/>		
F. OTHER (TYPE)	<u>Nylon Med. 1/2 In. High Filters</u>		

DATE OF RESPIRATOR INSTRUCTION 09/05/86

EMPLOYEE SIGNATURE: X Bruce W. Wickett

DATE: 09/05/86

CERTIFICATE OF COMPLETION

**MED-TOX**

ASSOCIATES, INC.  
OCCUPATIONAL AND ENVIRONMENTAL HEALTH SERVICES

THIS IS TO CERTIFY THAT

Bruce Wolcott

HAS COMPLETED 8 HOURS OF:

General Asbestos Training

ON September 8, 1986 AT Bartow, CA

Marcia Barenman/Wolcott  
PRESIDENT

APPENDIX K

LETTERS AND DISCLAIMERS, SENT FROM M.B. GILBERT ASSOCIATES TO THE JET  
PROPULSION LABORATORY, THAT ACCOMPANIED SUBMITTED REPORTS DESCRIBING  
THE TWO ASBESTOS FIELD SURVEYS CONDUCTED AT THE GOLDSTONE COMPLEX

# M.B. GILBERT ASSOCIATES

ENVIRONMENTAL ENGINEERING SERVICES • 2525 Cherry Ave. Suite 380, Long Beach, CA 90806 • 213/425-0700 • Telex 217 47 11

April 20, 1987  
File No. 71031.01

Mr. Len Kushner  
Jet Propulsion Laboratory  
4800 Oak Grove Drive  
Pasadena, CA 91109

ORIGINAL PAGE IS  
OF POOR QUALITY

Subject: Submittal of Asbestos Survey and Management/Abatement Plan, Contract No. 957527, and Disclaimer Regarding the Asbestos Survey.

Dear Mr. Kushner:

Please find enclosed herein five copies of the subject report. Also enclosed are copies of diskettes containing the text of the report and mylars of the drawings.

The asbestos survey conducted by M. B. Gilbert Associates (MBGA) at Goldstone Deep Space Communications Center (GDSCC) identifies the general locations and provides approximate quantities of friable and non-friable asbestos-containing materials in buildings and structures. As seen from a review of this report the survey team was as thorough as possible in its investigation; however, it is possible that some existing asbestos-containing material was not found. The primary reasons for failure to find existing asbestos-containing materials are as follows:

- 1) The asbestos-containing material is substantially inaccessible, e.g., within walls, crawl spaces, trenches, roof structures. MBGA suggests that due care be taken during demolition or remodeling operations to confirm the presence of such hidden asbestos-containing materials and measures be taken for protecting potentially exposed workers.
- 2) The asbestos-containing material is a relatively small portion of an equipment, appliance, or structure item. For example, heating elements may have interior asbestos material lining, valve glands may have asbestos and graphite packing, etc. It would be impractical, if not impossible, to identify such items individually. Again, in virtually

PRECEDING PAGE BLANK NOT FILMED

K-3

PAGE K-2 INTENTIONALLY BLANK

Mr. Len Kushner  
April 20 1987  
Page 2

all such cases the asbestos-containing material does not pose an existing hazard to personnel because it is non-friable, enclosed, and of small quantity. However, it is recommended that the purchasing department stipulate to suppliers that future purchases will not include asbestos-containing material and that persons performing maintenance on such items be warned of the potential existence of asbestos.

- 3) The asbestos-containing material is underground, e.g., buried pipe lines, old demolition disposal sites or landfills, etc. Such materials pose no existing hazard to base personnel, unless exposed at the time excavation. (There is, however, a growing concern that transite water pipes may release asbestos into the water supply.) Construction/maintenance/inspection personnel should be aware of asbestos hazards at potential or known burial sites; and GDSCC should ensure that proper precautions are taken if old pipe lines or demolition materials are uncovered which may contain asbestos.
- 4) The asbestos-containing material may be concealed beneath newly installed non-asbestos pipe or boiler wrapping. GDSCC staff assured MBGA staff that no asbestos-wrapped piping had been replaced by non-asbestos wrap prior to the survey.
- 5) Due to the size, number, and complexity of buildings and structures at GDSCC, some small or remote occurrences of asbestos-containing material may have been overlooked through human error.
- 6) The investigators were unable to enter certain areas at GDSCC because keys were not available or because equipment was in use preventing access. These areas are identified in the subject report.
- 7) A fixed number of samples were collected for analysis. Although a sufficient number of samples and reference blanks were collected, it is possible, although remote, that asbestos was not present in a sample, but was present in the item from which the sample was taken. Also, several vinyl tile floors had numerous vintages of replacement tiles present. Samples of selected existing and replacement tiles were collected, but each replacement tile was not sampled.



# M.B. GILBERT ASSOCIATES

ENVIRONMENTAL ENGINEERING SERVICES • 2525 Cherry Ave., Suite 380, Long Beach, CA 90806 • 213/426-0700 • Telefax: 213/492-132

October 29, 1987  
File No. 71031.08

Mr. Len Kushner  
Jet Propulsion Laboratory  
4800 Oak Grove Drive  
Pasadena, CA 91109

Subject: Submittal of Asbestos Survey of Roofs and Boilers at Goldstone Deep Space Communication Complex, Contract No. 957527, Modification 4, and Disclaimer Regarding the Asbestos Survey.

Dear Mr. Kushner:

Please find enclosed herein three copies of the subject report. Also enclosed are copies of diskettes containing the text of the report and mylars of the drawings.

The asbestos survey conducted by M.B. Gilbert Associates (MBGA) at Goldstone Deep Space Communications Center (GDSCC) identifies the general locations and provides approximate quantities of friable and non-friable asbestos-containing materials in specified roofs and boilers at GDSCC. While the survey team sampled for asbestos in all specified locations, there is the remote possibility that inconsistencies in the distribution of asbestos fibers in insulating materials could result in a negative finding for any particular sample analyzed. To minimize this possibility, corings of roofing materials were taken through the entire thickness of roof present, several samples were taken of each roof, and several replicate samples were taken of roofs and boilers for double blind testing by the laboratory. Reasonable care and diligence was used during the investigation to obtain representative samples.

In the subject report, MBGA discusses the dissolution of Cal/OSHA. This condition resulted from the intentional failure of the governor to reauthorize funding for the agency. The legality of the governor's action is being challenged in court, with the potential for reinstatement of the Cal/OSHA budget. MBGA advises GDSCC personnel to follow this issue until it is resolved, since reactivation of the agency would result in a change in procedural requirements for asbestos management.

PRECEDING PAGE BLANK NOT FILMED

PAGE K-6 INTENTIONALLY BLANK

Mr. Len Kushner  
October 29, 1987  
Page Two

If you have any questions regarding this disclaimer or the MBGA subject report, please do not hesitate to contact me.

Very truly yours,

M.B. GILBERT ASSOCIATES

A handwritten signature in cursive script that reads "Marsha Beck Gilbert". The signature is written in dark ink and is positioned above the printed name and title.

Marsha Beck Gilbert  
President

MBG:js

Attachment: Report on Asbestos Survey of Roofs and Boilers at  
Goldstone Deep Space Communication Center.

**APPENDIX L**

**NASA OCCUPATIONAL HEALTH OFFICE GUIDELINES (1983)  
FOR ASBESTOS HAZARD-ASSESSMENT AND ABATEMENT**



National Aeronautics and  
Space Administration

Washington D C  
20546

ORIGINAL PAGE IS  
OF POOR QUALITY

NPG-34  
NX-2

February 18, 1983

TO: Distribution

FROM: NPG-34/Director, NASA Occupational Health Office  
NX-2/Director, Facilities Division

SUBJECT: Hazard Assessment and Abatement of Asbestos in NASA Buildings

A NASA-wide project was initiated some time ago to determine the extent of asbestos-containing materials, particularly spray-applied insulation (SAI), in work spaces throughout the Agency. Buildings and locations that contained potentially hazardous sources of friable asbestos were identified, bulk insulation samples were collected, and the samples were analyzed for asbestos.

The results showed that asbestos is present in a variety of different materials at NASA. It was found to be present in SAI on surfaces of ceilings, plenums, walls, and structural steel. About three-fourths of the samples submitted for analysis contained asbestos. This represented eighty-one buildings and approximately four and one-half million square feet of insulation material. The condition of the SAI was visually assessed and most of the insulation was reported to be in good condition. Sixty-five percent of the locations were reported to have had no damage; thirty percent had minor damage; and five percent had significant damage. Corrective action has already been taken with regard to most of the damaged insulation that was found.

Even though we have a considerable amount of SAI that contains asbestos in our buildings, concerted abatement efforts such as enclosure, encapsulation, and removal are not warranted simply because of the presence of the material. There is no evidence that spray-applied insulation which is intact and in good condition poses a danger to the health of employees.

Our position with respect to the presence of asbestos in NASA facilities is summarized as follows:

- Asbestos SAI should not be removed from surfaces of NASA buildings simply because of its presence, nor should other abatement techniques be implemented.
- All areas containing asbestos SAI should be visually inspected at least annually for damage and signs of deterioration.

- Air sampling and analysis for airborne fibers should be performed annually, or more frequently as warranted, in areas containing asbestos SAI.
- Where hazard assessments reveal asbestos SAI to be in unacceptable condition-so that the health of building occupants is threatened, corrective actions should be promptly taken to eliminate or control the source of contamination. An "unacceptable condition" exists when the release of asbestos fibers from SAI and other sources results in airborne concentrations in excess of 0.1 fiber per cubic centimeter of air or when inspections reveal the material to be in a bad state of repair (dislodged, deteriorating, severely damaged, falling, etc).
- Medical examinations in accordance with the OSHA asbestos standard criteria (29 CFR 1910.1001) should be provided for employees routinely engaged in asbestos removal or repair (i.e., insulators), employees who frequently enter or work in contaminated areas (i.e., plenum spaces), anyone exposed for 7-8 hours to a time-weighted average concentration of 0.1 fiber per cubic centimeter of air or greater, and those who have had significant exposures to asbestos in the past.
- Accurate and up-to-date records should be maintained of all asbestos identification, work area surveillance, and abatement activities. Employees should have access to these records in accordance with OSHA requirements. Access to medical surveillance records shall be in accordance with NASA Privacy Regulations on Medical Records.

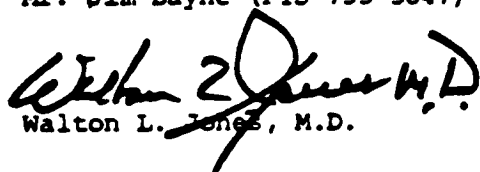
Guidelines and other information relative to visual inspection and air sampling and analysis are provided in Appendix A. Abatement methods are discussed in Appendix B.

The initial phase of the NASA asbestos project was primarily devoted to SAI; however, asbestos is also present in pipe and boiler lagging, cementous asbestos products (i.e., pipe and siding), friction materials, etc. Steps should be taken to ensure that any contamination and subsequent exposures resulting from the presence, handling, and use of all asbestos materials are adequately controlled. Any work involving asbestos must be appropriately coordinated and carefully monitored to ensure conformity with regulatory requirements, prevent personnel exposures, preclude building contamination, and minimize unnecessary costs and delays. Some guideline procedures pertinent to the handling and use of asbestos are provided in Appendix C.

This effort should be coordinated between facilities, medical and environmental health personnel. Each group should be responsible for performing those activities in which it has expertise. Jointly, they should develop local policies or procedures to ensure proper control of asbestos-related activities; select the most feasible and efficient abatement techniques; ensure that OSHA and EPA regulations (29 CFR 1910.1001 and 40 CFR 61.20-61.25, respectively) are

followed; and maintain records of activities, findings, and corrective actions involving asbestos. Top management, legal personnel, employee representatives, and others as appropriate should be kept informed of pertinent findings and developments.

A useful publication that was prepared at the Lewis Research Center is attached to this document as Enclosure 1 for additional information on asbestos. Any questions relative to this project should be directed to Mr. Jim Bayne (FTS 755-3647) or Mr. Gene Proctor (FTS 755-2077).

  
Walton L. Jones, M.D.

  
Billie J. McGarvey

Enclosures

ORIGINAL PAGE IS  
OF POOR QUALITY

1. Report No. 87-4, Vol. 4		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Environmental Projects Volume 4 Asbestos Survey				5. Report Date February 1, 1988	
				6. Performing Organization Code	
7. Author(s) M.B. Gilbert Associates/L. Kushner				8. Performing Organization Report No.	
9. Performing Organization Name and Address JET PROPULSION LABORATORY California Institute of Technology 4800 Oak Grove Drive Pasadena, California 91109				10. Work Unit No.	
				11. Contract or Grant No. NAS7-918	
				13. Type of Report and Period Covered  JPL Publication	
12. Sponsoring Agency Name and Address NATIONAL AERONAUTICS AND SPACE ADMINISTRATION Washington, D.C. 20546				14. Sponsoring Agency Code	
15. Supplementary Notes Sponsored by the National Aeronautics and Space Administration (RTOP or Customer Code 314-40-32).					
16. Abstract  The Goldstone Deep Space Communications Complex (GDSCC), near Barstow, California, operates in support of six large parabolic dish antennas. Many of the buildings and structures at the GDSCC were erected before it became known that asbestos posed a hazard to human health. Thus, because of concern with asbestos, two field surveys were conducted at the GDSCC in October/November 1986 and in September 1987 to locate, classify, and quantify all asbestos-containing materials in buildings, structures, roofs and boilers. This report describes the results of the two surveys and describes methods for both asbestos management and asbestos abatement. The surveys found that GDSCC practices involving asbestos are conscientious and forward-thinking. A program, due to start in FY 1988 and to be completed in FY 1990, is planned to remove all friable (easily pulverized) asbestos-containing materials discovered during the two field surveys for asbestos at the GDSCC.					
17. Key Words (Selected by Author(s))  Environment Pollution Safety Engineering			18. Distribution Statement  Unclassified-Unlimited		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 514	
				22. Price	